JUN 1 0 1

CIVIL ENGINEERING

Published by the American Society of Civil Engineers

WILL COSTS AND MATERIALS SHORTAGES HOLD UP RECONVERSION CONSTRUCTION? SEE PAGE 239

AMERICAN SOCIETY OF CIVIL ENGINEERS FOUNDED 1852

JUNE 1946

FOUNDATIONS

AS STRONG AS THE

ROCK OF GIBRALTAR

During the past 49 years Raymond has been recognized as a leader in the field of foundation construction. Over 11,000 contracts, throughout the world, testify to the confidence and security which this organization has created in the minds of engineers, architects and owners. The sum total of Raymond experience-wisdom is yours to command.

A FORM FOR EVERY PILE • A PILE FOR EVERY PURPOSE

Pier Construction in Latin America

INQUIRIES INVITED ON SMALL AND LARGE JOBS

THE SCOPE OF RAYMOND'S ACTIVITIES includes every recognized type of pile foundation – concrete, composite, precast, steel, pipe and wood. Also caissons, construction involving shore protection, ship building facilities, harbor and river improvements and borings for soil investigation.

RAYMOND
CONCRETE PILE CO.

Branch Offices in Principal Cities of United States and Latin America

140 CEDAR STREET, NEW YORK 6, N. Y.

Among Our Writers

DONALD D. KING (Iowa State Col., B.S. in C.E. '29) was Production Manager for CIVIL ENGINEERING for 13 years, then went to Washington, D.C., for 2 years to edit *Aviation Engineer Notes* for the Army. In 1945 he joined the staff of the McGraw Hill Co. as Asst. Editor of *Construction Methods*. Since March 1946 he has headed his own advertising agency in New York, the King Advertising Services, specializing in industrial accounts.

W. W. HORNER (Washington U., B.S. in C.E. '05, C.E. '09) has centered his professional activities in and near St. Louis. As Chief Engr. of Sewers and Paving he was responsible for the Des Pères Drainage Project, Oakland Express Highway, and Municipal Airport. His consulting practice, established in 1933, embraces municipal, sanitary, and hydraulic problems. For several years he was professor and lecturer at his alma mater.

M. C. LUBAR (U. of Mich., School of Business Admin.) worked with the FHA in Washington as an economist, did a study of decentralization of the Detroit central business district for the Urban Land Inst., and was research director of the Detroit City Plan Commission for about 3 years. The past year he has been associated with the Communities Redevelopment Corp. of N.Y., interested in large-scale projects.

A. J. PETERKA (Case School of Applied Science, B.S. '34) spent a year testing hydraulic models for the Muskingum Watershed Project (Ohio) at Case, and a year with the U.S. Engineers at Zanesville, Ohio, on construction of Tappan Dam. Since 1936 he has been with the TVA, designing, building, and testing hydraulic models, and making tests on completed prototype structures.

W. E. REYNOLDS (Iowa State Col. '11) became a consulting engr. and contractor in 1927. In 1932 he entered government service, and was successively Engr. Adviser to the RFC; Technical Asst. to the Asst. Secretary of the Treasury; Assoc. Director of the Procurement Div., Public Buildings Branch, Treasury; and since 1939, Commissioner of Public Buildings, Federal Works Agency.

KARL R. KENNISON (Colby Col., A.B. '06; M.I.T., B.S. '08) following work as asst. to John R. Freeman, Hon. M. ASCE, and for the Providence Water Supply Board, became head of the Emergency Fleet Corp.'s construction and maintenance work in New Orleans, Mobile, and Pensacola. From 1920 to 1926 he was a consulting engr. in Boston. Since 1926 he has been with the Metropolitan Dist. Water Supply Commission, for the past 7 years as chief engr.

DELBERT B. FREEMAN (N. Mex. Col. of Agriculture and Mech. Arts, B.S. in C.E. '25) became connected with the Corps of Engrs. in 1928, and worked on the "308" studies, Fort Peck Dam, and Missouri improvement. Commissioned in the Corps in 1942, he was made Executive Officer to the Div. Engr., Mo. River Div., and was closely connected with preparation of the "Pick Plan." Since 1943 he has been Dist. Engr., Omaha Dist., which has a large share in planning for the coordinated Missouri Basin project.

ROBERT A. MITCHELL (Cornell U., B. of Architecture '21) has been with the Bureau of Traffic Engineering of the City of Philadelphia since 1930, in the capacity of Chief of the Bureau since 1936. He has lectured on traffic engineering at a number of universities and made many transportation surveys in Philadelphia and other cities.

H. EVERT KINCAID (U. of Ill.) was successively with Harland Bartholomew, city planner; City Planning Engr. for San Antonio, Tex.; and chief land planning consultant for the FHA, for 11 Midwestern states. In 1941 he resigned to become director of the Master Plan Division, Chicago Plan Commission, and in 1943 was made Executive Director of the Commission.

VOLUME 16 NUMBER 6

June 1946

COPYRIGHT, 1946, BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS
Printed in U. S. A.

Entered as second-class matter September 23, 1930, at the Post Office at Easton, Pa., under the Act of August 24, 1912, and accepted for mailing at special rate of postage provided for in Section 1102, Act of October 3, 1917, authorized on July 5, 1918.

CIVIL ENGINEERING

Published Monthly by the

AMERICAN SOCIETY OF CIVIL ENGINEERS
(*Founded November 5, 1852*)
PUBLICATION OFFICE: 20TH AND NORTHAMPTON STREETS, EASTON, PA.
EDITORIAL AND ADVERTISING DEPARTMENTS:
33 WEST 39TH STREET, NEW YORK 18

This Issue Contains

COVER—Works and Laboratory Building for Johns-Manville Corporation Under Construction by Turner Construction Company (*see article, page* 239)

WATER TOPICS PREDOMINANT IN SPOKANE PROGRAM 237
Preview of Society's July Convention

HOUSING ORDER WILL SHRINK ENGINEERING CONSTRUCTION . . 239
Donald D. King

LOCAL SECTION VIGOR ESSENTIAL TO ENGINEER'S STATUS . . . 241
W. W. Horner

BETTER ENGINEERING RECOMMENDED TO PRESIDENT'S HIGHWAY CONFERENCE 242

LEGISLATION NEEDED FOR URBAN REDEVELOPMENT 245
M. C. Lubar

MODEL AND PROTOTYPE STUDIES ON UNIQUE SPILLWAY. Part III on Fontana Dam Spillway 249
A. J. Peterka

THE FEDERAL BUILDING PROGRAM 252
W. E. Reynolds

DISPOSAL PLANT TO ALLEVIATE BOSTON HARBOR NUISANCE. I. Existing Facilities to Be Used in Primary Treatment . . 254
Karl R. Kennison

MISSOURI RIVER BASIN DEVELOPMENT 258
Delbert B. Freeman

WHAT CAN BE DONE ABOUT TRAFFIC CONGESTION?
Traffic Engineering and Enforcement Methods 260
Robert A. Mitchell

City Planning, Zoning, and Housing 262
H. Evert Kincaid

ENGINEERS' NOTEBOOK
New Hydrant Assembly Conserves Space 265
Samuel C. McKee

A Direction-Indicating Velocity Tube 265
Wallis S. Hamilton

OUR READERS SAY 267

SOCIETY AFFAIRS 270

ITEMS OF INTEREST 282

NEWS OF ENGINEERS 14

DECEASED 16, 18

CHANGES IN MEMBERSHIP GRADES 18, 20, 24

APPLICATIONS FOR ADMISSION AND TRANSFER 24, 26, 30

RECENT BOOKS 30

ENGINEERING SOCIETIES PERSONNEL SERVICE, INC. 32

CURRENT PERIODICAL LITERATURE 34, 36, 38, 39, 40, 42

EQUIPMENT, MATERIALS AND METHODS 44, 45, 46, 48, 49, 50

INDEX TO ADVERTISERS 56

The Society is not responsible for any statements made or opinions expressed in its publications.

Reprints from this publication may be made on condition that full credit be given CIVIL ENGINEERING *and the author, and that date of publication be stated.*

SUBSCRIPTION RATES

Price 50 cents a copy; $5.00 a year in advance; $4.00 a year to members and to libraries; and $2.50 a year to members of Student Chapters. Canadian postage 75 cents and foreign postage $1.50 additional.

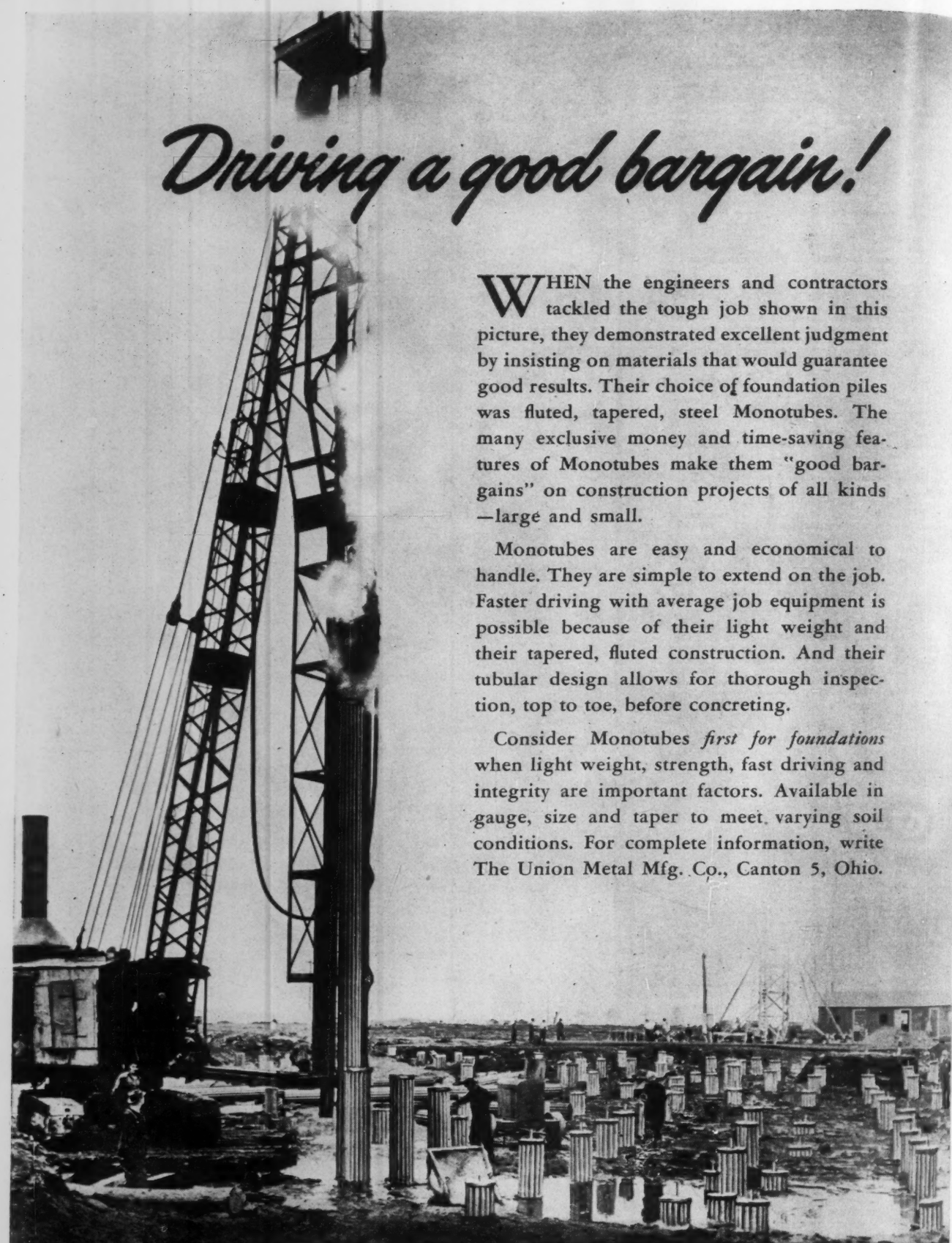
Member Audit Bureau of Circulations

Driving a good bargain!

WHEN the engineers and contractors tackled the tough job shown in this picture, they demonstrated excellent judgment by insisting on materials that would guarantee good results. Their choice of foundation piles was fluted, tapered, steel Monotubes. The many exclusive money and time-saving features of Monotubes make them "good bargains" on construction projects of all kinds —large and small.

Monotubes are easy and economical to handle. They are simple to extend on the job. Faster driving with average job equipment is possible because of their light weight and their tapered, fluted construction. And their tubular design allows for thorough inspection, top to toe, before concreting.

Consider Monotubes *first for foundations* when light weight, strength, fast driving and integrity are important factors. Available in gauge, size and taper to meet varying soil conditions. For complete information, write The Union Metal Mfg. Co., Canton 5, Ohio.



UNION METAL

Monotube Tapered Piles

W. W. Horner
President
William N. Carey
Secretary and Executive Officer
Sydney Wilmot
Editor in Chief and Manager of Publications
Don P. Reynolds
Associate Editor

CIVIL ENGINEERING

Committee on Publications
Harry F. Thomson
Chairman
John H. Gardiner
S. C. Hollister
William M. Piatt
Wilbur M. Wilson
W. L. Glenzing
Advertising Manager

Volume 16 — June 1946 — Number 6

Water Topics Predominant in Spokane Program

Annual Convention—Spokane, Washington—July 17–19, 1946

PLANS for the Annual Convention of the Society, to be held in Spokane, Wash., July 17–19, 1946, are rapidly being completed. The headquarters of the Convention will be in the nationally known Davenport Hotel.

TECHNICAL DIVISION SESSIONS

The technical program will deal with problems in connection with the development of the irrigation and power resources of the Columbia River basin, and the improvement of navigation conditions on the Columbia River.

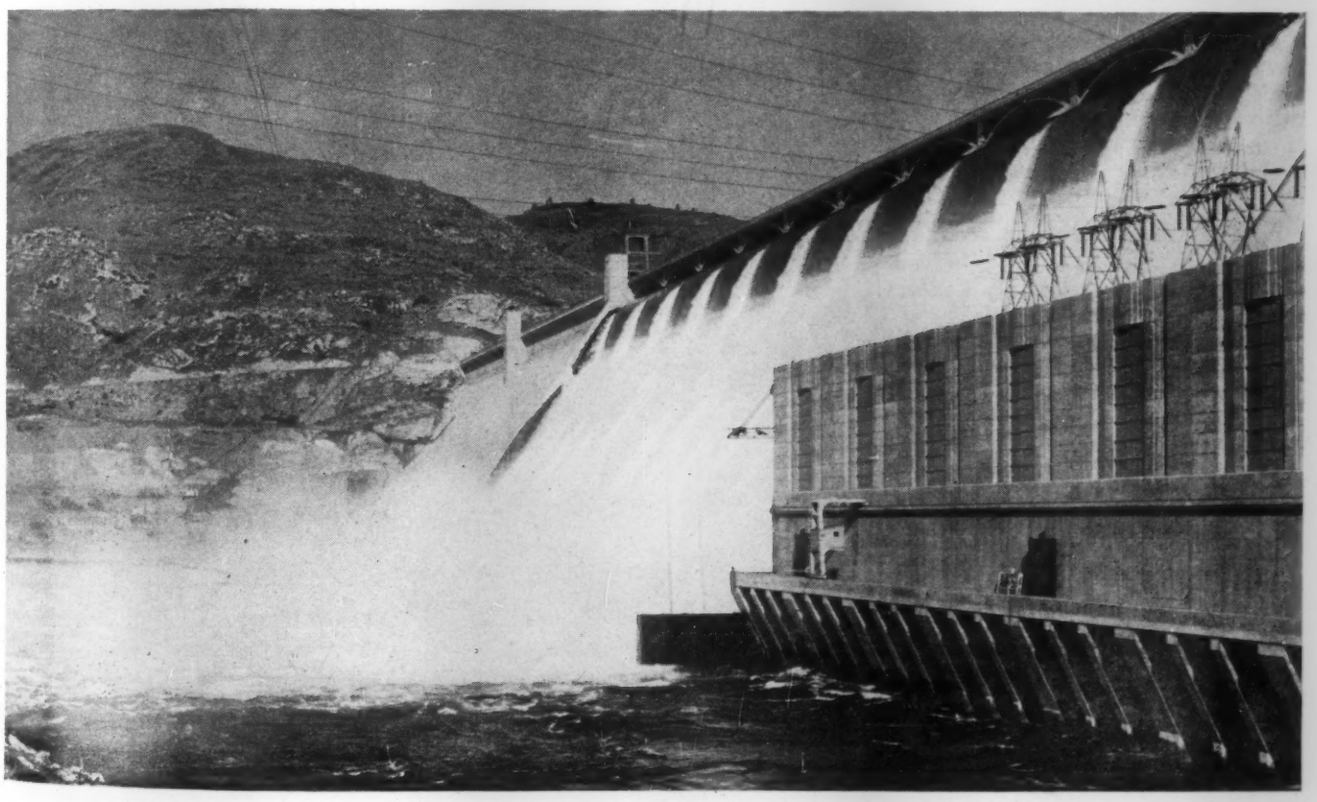
There will also be sessions dealing with the improvement of highways and sanitation and with the problems arising in the operation and maintenance of irrigation projects and hydroelectric stations.

The Convention and program arrangements are in the hands of a committee headed by H. J. Doolittle, president of the Spokane Section, with T. H. Judd as general chairman of the committee. The program is under the general chairmanship of W. L. Maloney, with Prof. Charles L. Barker as chairman of the technical features.

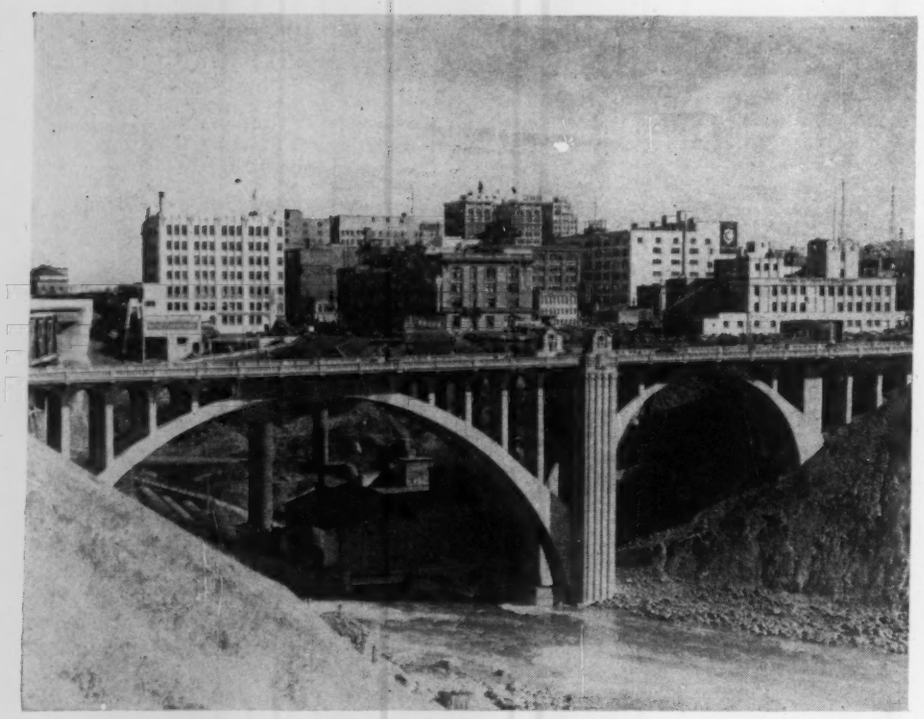
In addition to the entertainment features on Wednesday and Thursday, in which the ladies will participate with members, plans are being developed for special entertainment for visiting ladies. In addition to a special luncheon on Thursday, the ladies will be taken on scenic drives and sightseeing trips, for which the Spokane area is famous.

HOTEL ACCOMMODATIONS

The Hotel Davenport, headquarters for the Convention, has reserved a block of rooms for the accommodation of members and their families.



An All-Day Excursion to Grand Coulee Dam Is Planned for the July Convention



SPOKANE, HOST CITY TO ANNUAL CONVENTION OF ASCE

On account of the heavy summer travel and crowded hotel situation as a result, members are requested to write for reservations as far in advance of the Convention as possible, stating that the request is for attendance at the ASCE Convention.

In case the requests for rooms exceed the capacity of the Hotel, every attempt will be made to fill the reservation at nearby hotels. The rates at the Davenport range from $4.00 up for double and $3.00 up for single rooms, with bath.

FINAL PROGRAM

Complete details of the Convention will appear in the July issue of CIVIL ENGINEERING.

Following is a summary of the program giving the general subjects of the various sessions:

Summary Program

WEDNESDAY—JULY 17, 1946

MORNING

President Horner's Annual Address
Address on "National Reclamation"
Business Meeting
Luncheon, followed by Popular Address

AFTERNOON

Sessions of Technical Divisions

Irrigation Division
- Evolution of Irrigation in Alberta, Canada
- Irrigation West of the Cascades

Sanitary Engineering Division
- Proposed Sewage Works at Portland, Ore.
- Stream Aeration
- Proposed Plans for Pollution Abatement on Willamette River

Power Division
- Results of Automatic Hydro-Station Operation.
- Sand Traps in Open and Closed Conduits

EVENING

Dinner and Entertainment

THURSDAY, JULY 18, 1946

Sessions of Technical Divisions—All Day

MORNING

Irrigation and Power Divisions—combined session
- Stream Flow Forecasting for Irrigation
- Value of Storage for Power on the Columbia River

Highway Division
- Highway Construction and Our National Economy
- The National Highway Network and Military Transportation

Waterways Division
- Flood Control Problems of the Columbia
- U.S. Engineer Report on Columbia River Basin
- Navigation Progress on the Columbia

AFTERNOON

Hydraulics and Power Divisions—combined session
- Problems Related to Reservoir Sedimentation
- Removal of Sediment by Means of Density Currents
- Suspended Sediment Sampling

Structural Division
- Advances in the Technique of Examination of Suspension Bridges as a Result of the Tacoma Bridge Failure

EVENING

Sightseeing Trip followed by Dinner

FRIDAY, JULY 19, 1946

All-Day Excursion to Grand Coulee Dam

Members, Ladies, and Guests will go by bus for a view and inspection of Grand Coulee Dam, the greatest man-made structure, which involved the placing of approximately 11,000,000 cu yd of concrete.

A FEATURE OF SPOKANE'S SPECTACULAR SETTING IS THE HIGH BRIDGE

Housing Order Will Shrink Engineering Construction

Future Volume of Work Indicated in Address Before Construction Division at Philadelphia Meeting

By DONALD D. KING, ASSOC. M. ASCE
KING ADVERTISING SERVICES, NEW YORK, N.Y.

ONE billion dollars may be cut from the predicted 3.3 billion of heavy construction in 1946 by the CPA stop order of March 26. It is to be expected, however, that the volume of housing construction planned by the Civilian Production Administration will increase the overall or total construction volume in 1946 and 1947. The CPA estimates that 12.5 billion will be spent this year on all types of construction, including maintenance and repair work.

To meet the requirements of the accelerated housing program, less essential construction will be curtailed, the present available labor force in the construction industry will be tripled, and efforts will be made to provide production subsidies on building materials. Federal subsidies amounting to $400,000,000 are proposed to break bottlenecks and spur production. Construction already substantially under way will not be affected by the government stop order. This includes projects where the necessary basic materials are already incorporated into the structure.

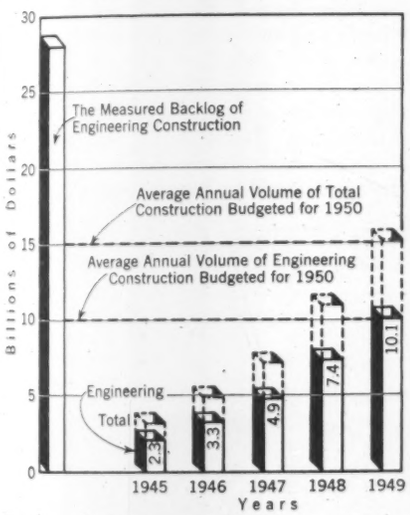


FIG. 1. CONSTRUCTION VOLUME AS FORECAST BY MCGRAW-HILL

REVISED FORECASTS

The housing program will not ban new construction in excess of stated minimums. Where work is absolutely necessary, such as additions to factories and other projects, the completion of which provides additional jobs, permission to proceed can be obtained.

A forecast of construction volume, as prepared by *Engineering News-Record*, is shown graphically in Fig. 1. The emergency housing program does not greatly change this overall construction picture but merely gives precedence to more essential work and further postpones many projects which will swell the yearly engineering construction expenditures in 1948, 1949, and 1950. On the basis of CPA and other figures now available, a 25% cut in industrial construction over the previously forecast level for 1946, and a 23% reduction in commercial construction are forecast by the McGraw-Hill economic staff. There should be little, if any, reduction in other types of construction—such as highways, utilities, and the like—which do not compete with, but rather supplement, housing construction.

LABOR AND MATERIALS

Labor conditions and the availability of materials during the next five years will be the major factors governing the volume of construction. Other factors are the redistribution of some 4,000,000 war workers from temporary locations to more permanent ones, and the redeployment of several million men from the armed services to their home communities.

Activity should be greatly accelerated in 1948, 1949, and 1950 because by then the construction industry should be well organized, materials more readily available, and our great mobile population stabilized.

BACKLOG OF PROJECTS

Such accelerated construction activities are presaged by the 29¼-billion-dollar engineering construction backlog recorded by *Engineering News-Record*. What kinds of work make up this backlog and how do they break down according to classification? Figure 2 shows 904 millions of proposed water-works projects; over 1.62 billions of sewerage work; 1.15 billions of bridge construction; 6.96 billions of earthwork and waterways construction; 3.81 billions of highway work; 6.19 billions of public buildings; 1.49 billions of industrial buildings; 2.15 billions of commercial buildings; and 4.99 billions of unclassified construction work, which

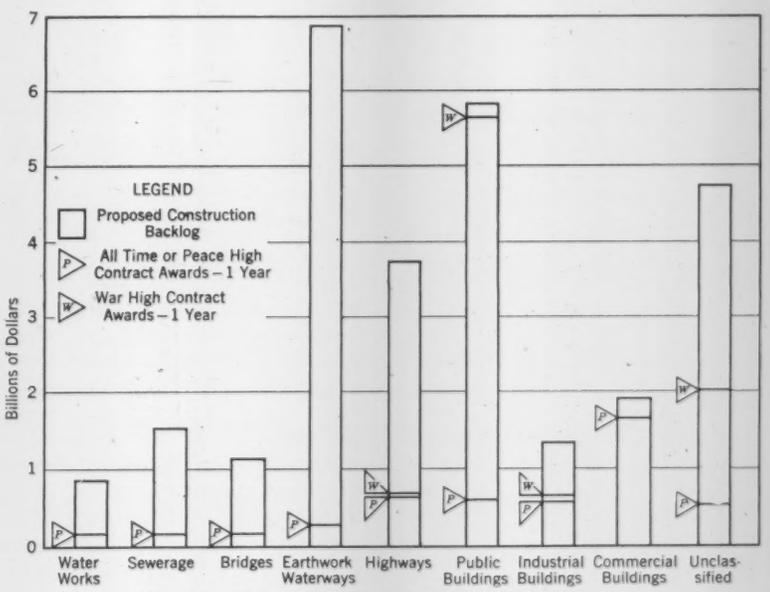


FIG. 2. CLASSIFICATION OF PROJECTS LISTED IN BACKLOG OF ENGINEERING CONSTRUCTION

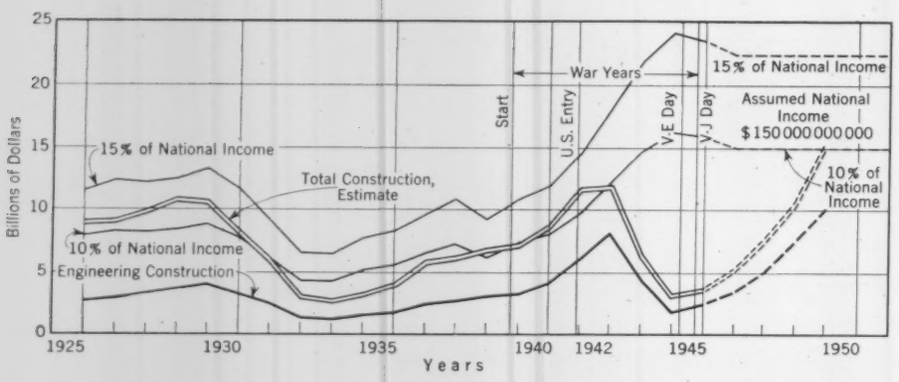


FIG. 3. RECORD OF CONSTRUCTION VOLUME IN RELATION TO NATIONAL INCOME

includes airport construction, pier construction, city and rural electric distribution systems, subways, and the like. In practically every instance—all except public and commercial buildings—the amount of proposed work on record is equal to several previous years of peacetime construction.

Past records give the best guide as to how important a part construction must play in our future economy. Figure 3 shows the range between 10 and 15% of the national income for the years 1925 through 1945, with a five-year projection based on an assumed national income of 150 billion dollars. The curve showing the estimated total of all construction for this same period is plotted to the same scale. This study shows that as long as construction volume remained within 10 to 15% of the total income range we had a reasonably prosperous economy, but that during those years when construction fell below the 10 to 15% range, periods of depression set in. During the war years, indicated by the shaded area, this situation did not hold, for in that period our whole productive capacity was being directed toward winning the war.

WHAT LIES AHEAD

Using as a premise the fact that construction must continue within the range of 10 to 15% of the national income if we are to have a healthy economy, the picture ahead for construction becomes clearer. Most economists agree that to have a prosperous economy, one that will provide for reasonably full employment, the national annual income will have to be in the neighborhood of 150 billion dollars. This is a level some 50 billions under the wartime peak, but is considerably higher than any previous peacetime year.

Assuming the attainment of a national income of 150 billions in the years immediately ahead, what is likely to happen to construction? As predicted by *Engineering News-Record* early in 1946, the volume of total construction is expected to advance from the 3.3 billion attained in 1945 to over 5 billions in 1946, moving consistently upward and reaching a total of 15 billions in 1949.

BUREAU OF LABOR DATA

For comparison, data of early 1946 from the Bureau of Labor Statistics are also presented. From a total construction figure of 4.7 billions recorded for 1945, the Bureau expected an advance to 8.3 billions in 1946, a 76% increase. The Department of Commerce figure was 60%. Predictions of the Bureau of Labor Statistics were based on an expected "fairly good supply of building materials by mid 1946" and "no major shortage of labor during the year." The total program is expected to supply employment for 1,600,000 workers.

Engineering construction should approximate two-thirds of the total of all construction during the years ahead, reaching a 10-billion-dollar figure in 1949. Ten billions of engineering construction and 15 billions of total construction are generally agreed on as necessary for the maintenance of a prosperous, healthy economy. Obviously it will be impossible to maintain a constant volume of construction year in and year out, but it is hoped that it may be possible to level off the peaks and valleys which have been so prevalent in past construction curves, by careful planning of public and private expenditures.

COSTS ARE HIGH

The picture ahead is bright, but there are clouds in the immediate future which must be cleared up if the industry is to accomplish its goal. Costs of construction are high and may go higher. Costs that are too high can slow up construction. As a matter of fact, many contracts have already been held up because of high bids. It will be noted from Fig. 4 that the construction-cost index—materials plus common labor—in January of 1946 was running 31% higher than the 1940 average. At the same time the building-cost index, which reflects materials plus skilled labor, was up 20%.

In conclusion let me summarize that we now have over 29¼ billion dollars of backlogged engineering construction reported—that, during the last half of 1945, construction volume increased at a 61% rate—that at least a 50% increase in construction volume over the next four years can be expected, and that a 10-billion-dollar engineering construction volume, or 15-billion-dollar total construction volume, should be maintained in succeeding years to assure a reasonably prosperous economy at an estimated national income of 150 billion dollars a year.

The accompanying diagrams are presented through the courtesy of the *Engineering News-Record*.

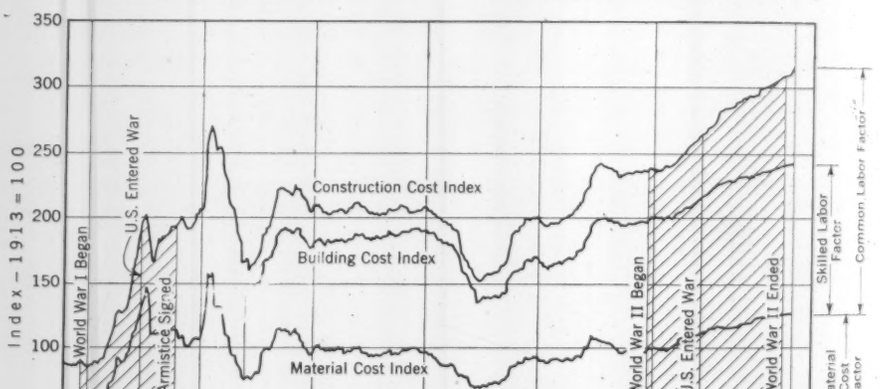


FIG. 4. TREND OF CONSTRUCTION-COST INDEX

Local Section Vigor Essential to Engineer's Status

A Nine-Point Program Presented at Philadelphia Local Section Conference

By W. W. HORNER, PRESIDENT ASCE

A REAL effort of nation-wide scope, in which all Local Sections of ASCE must participate actively, continuously and forcefully, is required if we are to enhance the professional and economic status of the civil engineer. More specifically, if we older members of the profession truly desire to assist in the development of younger engineers, the following nine-point program of activity at the local level is necessary:

1. Adjustment of nationally recommended salary schedules to local conditions and to job classifications of individual employees.

2. Stepped-up programs of publicity and public relations, pointed toward a better understanding by the public of the value of engineering service.

3. Branch employment service to help place engineers in positions to the best advantage of the individuals and the public.

4. More detailed assistance and guidance to the younger men, with respect to development of their careers.

5. Improved quality of engineering through arrangements for refresher courses, and well-selected technical programs.

6. Development of the younger men through participation in all phases of Local Section work.

7. Increased individual member interest in Society affairs, through open-forum discussions.

8. Active participation in local engineering councils.

9. More assistance to Student Chapters; more definite programs to promote applications for Junior membership from graduates.

All these matters were discussed at the recent exploratory conference in New York; some became recommendations which have been referred to our administrative committees. Most of them do not point directly at improved engineer income, but all of them if actively prosecuted would eventually react significantly in that direction.

The very fact that we engineers have been devoting an increasing amount of attention to our social and economic status is proof that we have by no means attained the heights to which we aspire. The constant striving of our Founder Societies to elevate the status of the memberships offers equally good proof that forward-looking steps are being taken.

STATURE AND STATUS

An idealistic portrait of a professional engineer implies gracious living and freedom from worry about bills and mortgages. The men who founded our national societies undoubtedly were models for such a picture, and I can see it personified in many of the older men in the Society whom I have known in recent years. It is a stature and a status to which all of the younger men should look forward, even though many never fully achieve it.

This picture seems a far cry from such sordid questions as collective bargaining. The policies and actions of the national Founder Societies as to the welfare of the individual engineer have gone through a long transition. In those earlier years, when the Society was founded, the economic condition of its membership was outside the pale of the Society's interests. Gradually a broader interpretation came into being.

NEW ACTIVITIES UNDERTAKEN

Its amended By-Laws of some fifteen years ago provided for a Committee on Professional Objectives which, among other things, gives "particular consideration to the economic and social status of the engineer." It has also established a Committee on Salaries "to be of practical assistance when called upon in the adjustment of disputes arising out of classifications or salaries." In 1943 it established the Committee on Employment Conditions to "organize so as to be of practical assistance when called upon in the adjustment of disputes arising out of conditions of employment."

A PRESIDENT'S CONFERENCE

President Horner Takes a Last Glance at His Speech Before Its Presentation. Francis Friel, President of the Philadelphia Section, Advises

At the present time ASCE recognizes fully a responsibility in the matter of the economic status of its members and of the profession as a whole, and welcomes the opportunity to be of further service in this matter, which in reality affects the very existence of every engineer as a professional man.

COMPENSATION AND STATUS

The compensation of employed engineers in most instances has come up during the war to about a parity with the cost of living index. But this increase has not been universal and there is need to bring backward agencies and employers up to that level. We believe that beyond that there is the continuing need, which we have felt for many years, of further development of the economic status of the employed engineer to a point well above that of the mechanic and the sub-professional technician.

That campaign must go forward since we are convinced that only in a secure position and with adequate compensation can the engineer fully devote himself, without distraction, to the betterment of his profession and to the welfare of the public. In such a sound position, too, he would have little need to be interested in collective bargaining and would be expected to take active steps to prevent himself from being included in such groups against his will. It is my personal feeling that the collective bargaining problem rep-

resents only one corner of the greater problem of economic status. At the present time it is the conspicuous element.

PROBLEM OF YOUNG MEN

It appears to me that the professional engineer has a definite and rather satisfactory place in society; that he is at all stages of his career contributing to the welfare of the public, that in general the older men have a fairly satisfactory and sound economic position. The problem is, in the main, that of the younger engineer.

When it is stated by the A. F. of L. that the apprentice carpenter in his first four years earns $6,300, while the engineer is spending $4,000 to go through college, some might well wonder whether they should not have chosen a trade. And when it is shown that under the previous federal civil service salary classification, the engineer three or four years out of college may be earning for 40 hours of work $70 a week, while the carpenter-foreman possibly three or four years after concluding his apprenticeship may be earning $86 a week, the question not only still lingers but actually becomes a burning one—and understandably so.

ACTION AT THE LOCAL LEVEL

I believe that the younger engineer, if he has acquired the truly professional attitude, may come to accept some such situation as an incident in his progress. But we older fellow professionals should do our utmost to avoid straining his idealism and his long-range viewpoint too much, and I am strongly impressed that definite action programs by the engineering societies for further improvements in the compensation of engineer employees are essential to the maintenance of the professional attitude and to the value of engineering service to the public.

Such programs have been undertaken at a national level by officers and members of ASCE. However, I am convinced that if any such program is to be fully effective it must have vigorous support and active promotion at the local level. Our members in their own communities are strategically located to accomplish proper recognition of the status of the engineer. Probably every one of the nine specific suggestions I have made here has already been a part of the program of some Local Section. Yet it is essential that each of them become an element in the programs of all the Local Sections.

Better Engineering Recommended to President's Highway Conference

A LACK of properly trained engineers in highway organizations was cited as a factor contributing to inadequate road facilities, at the President's Highway Safety Conference held in Washington, D.C., May 8, 9, and 10. Other ways and means of cutting down the mounting toll of highway accidents were formulated by experts from practically every related agency or organization. Among these were the representatives of ASCE, most of whom served actively on the Committee on Engineering.

While other groups were investigating such aspects of the traffic situation as education and enforcement, the Committee on Engineering brought forth a recommended action program which, if universally adopted, should minimize the contribution of physical highway conditions to the massacre on the roads. Head of this 75-man engineering committee was Gibb Gilchrist, M. ASCE, president of the Agricultural and Mechanical College of Texas, and member of the ASCE Highway Division Executive Committee.

General chairman of the Conference, was Maj. Gen. Philip B. Fleming, M. ASCE, Federal Works Agency Administrator, and the chairman of the Coordinating Committee was Thomas H. MacDonald, Hon. M. ASCE, Commissioner of the Public Roads Administration of FWA.

ENGINEERING RECOMMENDATIONS

Forty-two points for making highways of America less deadly were summarized in the report of the Committee on Engineering. These follow:

1. It is recommended that provision be made for continuous and intelligently planned programs of publicity, education, and law enforcement, without which the maximum benefits of engineering contributions to traffic accident reduction cannot be obtained.

a. There is particular need to impress legislators and administrators with the fact that engineering standards cannot be

EXPRESS TRAFFIC APPROACH TO THE TRIBOROUGH BRIDGE IN QUEENS, NEW YORK CITY

translated into highway safety unless adequate funds and suitable engineering personnel are made available.

b. The education of the general public in the safe use of vehicles, highways, and streets, ranks high in importance. Engineering can accomplish much in accident prevention, but even with the finest possible engineering effort, the attitude and actions of individual pedestrians and drivers will still be prime factors in accident causation.

c. Particularly in this era of over-age vehicles, an urgent request should be made of every motorist to fulfill his fundamental, moral, and legal responsibility by maintaining his vehicle in safe operating condition.

d. In the field of formal education, more fellowships for traffic engineering training at the graduate school level should be provided at American colleges and universities. To the extent practicable, the teaching of traffic safety and operation principles should also be incorporated in standard college and secondary and elementary school courses.

e. Intensive educational programs and conferences on traffic safety and operation principles should be extensively conducted.

2. Within state and municipal jurisdictions, there are many public officials and groups whose efforts are directly or indirectly related to traffic safety. Planners, housing officials, engineers of highway and street design, construction, maintenance, and operation, police, educators, and the various safety organizations and civic groups are examples of this distribution of interest. There is a genuine need for creation of a practical means for effectively coordinating the everyday and long-range safety efforts of such individuals and groups. It is recommended that prompt action be taken by the appropriate governmental agencies to attain this objective.

TRAINED ENGINEERS NEEDED

3. Recognizing that greater safety on the highway can be obtained by a more intensive application of sound engineering and maintenance measures, it is recommended that trained engineers with proper experience be placed in the appropriate organization structures and given adequate remuneration and assurance of continuity in tenure of their positions.

4. In specific recognition of the need for better staffing of official agencies concerned with highway engineering problems, it is recommended that there be established:

a. In each state highway department, a division responsible for the application of engineering measures in the field of traffic operation and control. This division should be comparable in authority to other principal divisions, such as design, construction, and maintenance. It is very important that engineers trained in traffic-operation principles be employed also in the design division.

b. In cities having more than 100,000 population, a traffic engineering unit comparable in authority and influence to other major divisions of the department of public works or corresponding organization.

c. In cities having between 50,000 and 100,000 population, at least one full-time traffic engineer vested with sufficient authority to insure the adoption of appropriate engineering measures for traffic operation and safety.

d. In cities having less than 50,000 population, an engineer, preferably the director of the department of public works, the city engineer, or some member of his staff, with qualifications and experience necessary to perform the functions of traffic engineering.

5. It is recommended that every effort be made to continue and advance uniformity in roadway signing, signaling, and marking, in the design of roadways and structures, and in lighting devices and safety appurtenances required or used on motor vehicles. Administrative authorities are urged to follow the general standards recommended elsewhere in this report.

TRAFFIC ENGINEERING STRESSED

6. It is recommended that greater weight be given to traffic engineering and safety considerations at the design stage of vehicles and highways. Such considerations have, in the past, been subordinated on occasion to matters of appearance and economics. Safe utility of a vehicle or highway is best assured when safety features are built in at the time of construction.

7. It is recommended that diligent examination and study be made of all existing roads and streets to detect locations of undue hazard and to correct or improve such conditions through application of the appropriate engineering or control measures.

8. It is recommended that there be established an effective and continuing liaison among motor-vehicle manufacturers, road builders, and operations engineers for the purpose of promoting closer coordination of (1) vehicle design, (2) the geometric and structural plans for streets and highways, and (3) the plans for operation. Such liaison will have its maximum value if the participants are persons of high rank in the phase of highway transportation which they represent.

9. Traffic safety should receive greater emphasis in urban redevelopment and new land development plans. It is recommended that housing, planning, and engineering officials engaged in or responsible for such work consider the traffic safety features of all such proposals and introduce, wherever justified, added facilities or revised street and land-use plans to accommodate in a safe manner the travel requirements of the motorists and pedestrians affected. Cooperative action between planning authorities and highway engineers can do much toward minimizing accident hazards.

10. It is recommended that research into human and physical factors relating to traffic safety be greatly extended and intensified. Agencies in a position to conduct such research should be urged to undertake projects and to contact the Highway Research Board of the National Research Council, which is in a position to suggest worthy projects and otherwise to aid as a research "clearing house."

MODERNIZATION OF HIGHWAYS

11. It is recommended that definite provisions be made for the modernization of all principal highways and streets so as to furnish safe traffic-operating conditions for the foreseeable future.

12. In proceeding with a modernization program, the standards, policies, and guides developed after exhaustive traffic and engineering investigations by the American Association of State Highway Officials, the Public Roads Administration, and other appropriate agencies, are recommended for general application.

13. It is recommended that sufficient width of right of way be acquired, and the necessary access control be provided, on arterial routes so as to reduce hazard, increase the ease of driving, minimize obsolescence, and protect the investment in the improvement.

14. It is recommended that the improvement of the farm-to-market, to school, to home, to work types of secondary roads and streets be such as to make them safe for year-round use.

15. In recognition of the unusual hazards at railway and highway crossings at grade, it is recommended that these crossings be eliminated with priority determined on the basis of hazard and economy of traffic operation. Provision should be made for adequate protection of existing railway grade-crossings where the construction of separation structures is not feasible. Full and consistent use of the federal funds authorized under existing highway acts of the

Congress for railway grade-crossing elimination and protection is recommended.

16. It is recommended that sidewalks and other pedestrian facilities be provided by appropriate means on highways and streets where justified by the volume and character of vehicle and pedestrian traffic.

17. It is recommended that a combination of highway maintenance operations be so conducted as to provide a smooth, skid-resistant surface; safe, even shoulders; adequate drainage; and a clear right of way.

18. It is recommended that modernized street lighting be applied on main urban streets and on the more hazardous sections of highways, particularly near the entrances to municipalities, where there is considerable pedestrian traffic. The recently issued "Recommended Practice of Street and Highway Lighting" of the Illuminating Engineering Society will be a helpful guide in this work.

19. With further respect to visibility, it is recommended that means be employed to utilize vehicle headlighting to better advantage by designing structures and other roadway elements with surfaces of such color, texture, light-reflecting quality, area, and geometric position with respect to approaching vehicles that the presence, dimension, and position of these roadway elements will be disclosed to the maximum extent practicable.

APPLICATION OF DETAILS

20. Traffic hazards can frequently be reduced by relatively simple or localized engineering treatments. The following are recommended as typical applications:

a. Use of raised median strips on wide, heavily traveled streets.
b. Use of adequate turning radii at intersections.
c. Intersection channelization.
d. Provision of additional lanes for trucks on grades and special facilities for buses and other mass-transit vehicles.

21. It is recommended that appropriate authorities adopt as a working standard the Manual on Uniform Traffic Control Devices, prepared by joint effort of the American Association of State Highway Officials, the Institute of Traffic Engineers, and the National Conference on Street and Highway Safety. The manual, a revision of which will be issued this year, contains recommended practice for the application, design, location, installation, and maintenance of highway signs, way traffic signals, pavement markings, and islands. Substantial conformance with its provisions on streets and highways built with federal funds is required by the Federal-Aid Highway Act of 1944.

22. It is recommended that the basic principles of Article VI of Act V of the Uniform Vehicle Code be adopted. Article VI provides for the establishment of speed restrictions and, among other provisions, authorizes speed zoning and prescribes separate day-and-night speed limits.

23. The principle of speed zoning, based on adequate factual investigation, is recommended for wider application. The practice of marking safe operating speeds on curves is especially commended.

24. It is recommended that the practice of establishing low speed limits but permitting high tolerances be discontinued.

25. It is recommended that full use be made of all pertinent and available facts on traffic operation in the design, redesign, and control treatment of streets, highways, and vehicles.

PARKING FACILITIES

26. It is recommended that plans be made for the provision of off-street parking facilities as the ultimate solution of the parking problem in congested metropolitan areas. These facilities should be designed and located with respect to terminal requirements and, wherever practicable, with ready access to preferential type streets.

27. It is recommended that the best possible use be made of curb parking space. Angle parking, though it accommodates more cars along the curb, frequently creates hazard and interference with moving traffic.

28. It is recommended that additional use be made of the one-way street principle, wherever practicable, to increase street capacity and improve safety.

29. It is recommended that channelization be used more extensively to guide vehicles on a safe course through large-area intersections and to provide safe refuge points for pedestrians.

30. To increase further the protection afforded the pedestrian, additional facilities, such as loading islands, marked crosswalks, sidewalks, overpasses and underpasses, and barricades, should be constructed where pedestrian and vehicle volumes and roadway conditions warrant.

31. It is recommended that consideration be given to the segregation of vehicles according to their performance characteristics. Designation of certain streets, routes or separate lanes for special classes of traffic, such as trucks or busses, may often facilitate movement and reduce operating hazards.

32. The limits of vehicle size and weight recently proposed by the American Association of State Highway Officials after ratification by a majority of the States, are recommended for general adoption.

33. Because of the loss in motor-vehicle development effort occasioned by the war, it is recommended that particular effort now be directed toward continued improvement in all elements of car design affecting safety, such as brakes, headlighting, driver vision, tires and rims, bumpers, and direction signals.

34. It is recommended that there be strict enforcement of laws concerning the use of lower beams from headlamps.

35. It is recommended that there be strict enforcement of laws regarding overloading of commercial vehicles.

36. It is recommended that the manufacturer's authorized gross vehicle weight be used as a basis for the registration of trucks to control overloading.

37. In the interest of improving uphill performance of commercial vehicles, it is recommended that stress be placed on the maintenance of proper relationships between the gross vehicle weight of trucks and combinations and the horsepower output of their engines.

38. Statutory periodic inspection of motor vehicles is recommended, since it is an essential part of a complete safety program. Such inspections preferably should be made in government-owned and operated stations, wherever practicable.

39. With further respect to motor-vehicle inspection, it is recommended that the procedure employed be based on the American Standard Code for the safety inspection of vehicles. Efforts to improve instrumentation for safety inspection work should be continued.

40. It is recommended that steps be taken to see that all car and truck dealers are equipped to give and promote adequate headlight service.

41. It is recommended that everything possible be done to make an increasing supply of tires available at the earliest possible moment so that badly worn, unsafe tires now in use can be replaced.

42. It is recommended that there be no provision for limitation of maximum speeds by the compulsory use of governors.

Legislation Needed for Urban Redevelopment

By M. C. LUBAR

VICE-PRESIDENT, COMMUNITIES REDEVELOPMENT CORPORATION, NEW YORK, N.Y.

AT the core of all our major cities large areas have been blighted as they became increasingly undesirable for either residential or high-grade commercial use. Redevelopment of such areas has been undertaken in certain cases by private and public housing agencies. To spur this program, Mr. Lubar suggests an extensive legislative program aimed at making construction and operation of low-cost housing projects economically feasible. This article has been extracted from an address before the recent joint meeting of the Highway and City Planning Divisions, ASCE.

REDEVELOPMENT of our blighted urban areas will cost an estimated thirty billion dollars or more. Inasmuch as the Federal Government cannot be expected to bear more than a fraction of this cost, the means for immediately initiating urban redevelopment programs must be provided at the state and municipal levels. To be physically and economically feasible, such programs must reduce the cost of housing occupancy to within the reach of the lower and middle income groups.

The development of means for producing low-cost housing is prerequisite to the rebuilding of urban blighted areas for several reasons. In the first place, the present occupants of blighted areas are almost entirely in the low-income groups. A study of a typical blighted area in Detroit, for example, revealed that about 80% of the families paid less than $30 a month for rent (Table I).

TABLE I. ESTIMATED PERCENTAGE DISTRIBUTION OF FAMILIES IN A TYPICAL BLIGHTED AREA IN DETROIT BY MONTHLY RENT PAID—1940

Data from Detroit City Plan Commission

MONTHLY RENT	% DISTRIBUTION
Under $10	0.3
$10–14	4.4
15–19	14.7
20–24	25.8
25–29	34.7
30–39	16.8
40–49	2.5
50 and over	0.8
Total	100%

As a practical matter, the emphasis in urban development should be on the rehousing of the low-income occupants of blighted areas.

Second, the very size of blighted areas necessitates that the major portion of their redevelopment be for the middle and low-income groups. Detroit, for example, has some ten square miles of residential area in need of redevelopment. Even at relatively low densities, these areas could accommodate from 100,000 to 150,000 dwelling units. Of 430,000 families in Detroit in 1940, however, only 50,000 paid more than $50 a month for shelter. The potential market for the higher rental units, therefore, is considerably less than the volume of such housing which Detroit's blighted areas can accommodate. Furthermore, probably only a small proportion of the higher-income families would constitute a potential market for dwelling units in redevelopment projects inasmuch as the dwellings now occupied by families in this income group are, for the most part, satisfactory.

Third, the need for low rents in redevelopment projects is equally clear from the standpoint of the private developer and investor. High rents will not only restrict the size of the potential redevelopment program, but will also increase the risk in a field already complicated by difficulties of land assembly, high land costs, and governmental restrictions. The lower the rents, the less will be the risk involved, and consequently the more attractive will be the investment.

HOUSING OCCUPANCY COSTS

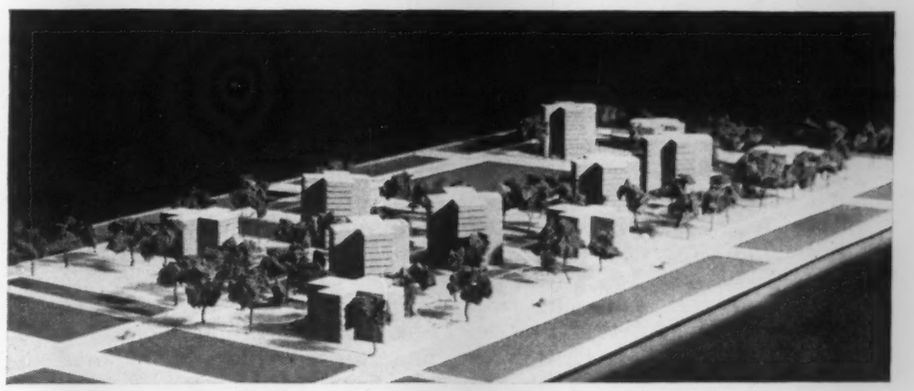
Basically, the cost of occupying a dwelling unit is composed of charges for maintenance, taxes, financing, and vacancy. These charges are illustrated in Table II, which presents project details and an operating statement for a typical urban redevelopment project constructed under present conditions by private enterprise without any governmental assistance, as compared with those for a housing authority. The required monthly rental for private enterprise is found to be $22.39 per room, or almost $90 for a four-room unit, which obviously is beyond the reach of over 95% of our urban families. If this required rental is to be reduced, one or more of the component charges must be decreased.

Maintenance expense depends largely on the cost of labor and materials. They are normally unsusceptible to any substantial reduction as they are largely beyond the control of the operator.

One method of effecting a reduction in occupancy costs obviously lies in tax abatement. In fact, tax abatement probably affords the most readily available means for municipalities to assist redevelopment projects in reducing their required rents. Although this may result in either a decline in revenues or a slight increase in the tax rate, the fact remains that unless some tax exemption is extended practically no urban redevelopment will be accomplished.

Any tax exemption thus granted is probably offset, in part, by reductions in the costs of municipal services, which are likely to result from the elimination of blighted areas. Unless these areas are redeveloped, furthermore, the decentralization of urban population will continue and, as a result, the tax base of municipalities will be further reduced.

Financial charges on a housing development depend upon (1) the cost of the project, (2) the required rate



Smith, Hinchman and Grylls, Architects

MODEL OF PROJECT FOR ST. LOUIS, WHERE LOW LAND COST PERMITS A DENSITY OF 50 UNITS PER ACRE

of return, and (3) the amortization schedule. The first of these, total project cost, comprises land and improvements. It is useful to analyze these costs separately in order to evaluate their individual effect on the required room rental. In the illustrative project referred to in Table II, the land and site improvements are assumed to cost $12,000,000, an average of $3 per sq ft, or $550 per room. To yield a return of 5½% on this investment and to amortize it in the required period, $3.41 per room per month is required. Since suitable vacant land can generally be purchased at $0.50 per sq ft with utilities already installed, it is evident that the excessive cost of land in blighted areas increases the required rental by approximately $3 per room per month in the illustrative project.

TABLE II. DEVELOPMENT COSTS AND OPERATING STATEMENT FOR A TYPICAL REDEVELOPMENT PROJECT

PROJECT DETAILS	UNAIDED PRIVATE	HOUSING AUTHORITY
Site area	100 acres	Same
Number of rooms	22,000	Same
Number of dwelling units	5,000	Same
Tax rate	3%	Same
Assessed valuation:		
At time of acquisition	$ 8,000,000	Same
After redevelopment	$32,000,000	$8,000,000
Maintenance cost per room per year	$55	Same
Financing:		
Mortgage interest rate	4%	2%
30-year amortization	$29,400,000	Same
Equity return of	9%	4%
On 20-year retirement of	$12,600,000	Same
Vacancy loss	10%	6%
Development cost:		
Land acquisition	$ 8,500,000	Same
Site improvements	$ 3,500,000	Same
Construction	$30,000,000	Same
Total	$42,000,000	Same

	UNAIDED PRIVATE		HOUSING AUTHORITY
OPERATING STATEMENT	Annual	Per Room per Month	Per Room per Month
Maintenance	$1,210,000	$ 4.58	$ 4.58
Taxes	960,000	3.64	0.91
Mortgage debt service:			
Interest	1,176,000	4.46	5.02 total
Amortization	588,000	2.23	
Equity investment:			
Return	1,134,000	4.30	3.52 total
Retirement	252,000	0.94	
Vacancy loss	591,000	2.24	0.90
Total rental required	$5,911,000	$22.39	$14.93

CONSTRUCTION CHARGES

The total cost of the construction and carrying charges in the illustrative project is assumed to be $30,000,000, or $1,500 per room. To provide the required rate of return on, and amortization of, this investment, a monthly charge of $8.53 per room would be required. The cost of construction depends largely on the cost of labor and materials, over which, as a practical matter, the developer has little control. Consequently opportunities for reducing the monthly financial charge arising from the development costs are limited largely to either a reduction in the interest rate or an extension of the amortization period.

Second of the financial charges is the required rate of return. The amount required to provide the average return of 5½% in the illustrative project is $8.76 per room per month. This charge will depend upon the interest on the mortgage and return on the equity, and the relative amounts of mortgage and equity financing involved. If the mortgage interest rate on the illustrative project were reduced from the assumed 4% to 3% for example, a saving of almost $1.50 per room per month would result. An equivalent saving could be effected by reducing the required return on the equity investment from the assumed 9%, which is close to the minimum return commonly expected on conventional real estate investments, to 6%.

The income tax status of the securities is another major determinant of the rate of return required. If the income derived from redevelopment projects could be made tax exempt, the required rate of return could be reduced substantially.

Inasmuch as equity capital will demand a higher rate of return and a shorter amortization period than mortgage capital, any means for decreasing the proportion of equity financing will reduce the required rate of return. For example, while a 70% mortgage carrying a 4% interest rate and a 30% equity investment with a 9% return, will require an average overall return of 5½%, a 90% mortage and 10% equity investment would reduce the average required return to 4½%, without changing the yield on either investment. Translated into monthly charges, this reduction in yield would effect a saving of $1.60 per room per month in the illustrative project. This would have the further effect of enabling the equity funds available for investment in urban redevelopment to finance a greater number of projects.

Third of the financial charges on the project is amortization. Assuming a level payment plan, the monthly cost of amortizing the mortage on, and the equity investment in, the illustrative project aggregates $5.40 per room for the first year. Some reduction in the cost of occupancy can be effected by extending the amortization beyond the periods assumed for the illustrative project, but this reduction probably will be offset, at least in part, by an increase in the interest rate.

The 10% allowance for vacancy losses amounts to $2.24 per room per month in the illustrative project. The size of this item depends primarily on the other cost elements since, obviously, the lower the required rent, the smaller will be the vacancies. Any decrease in vacancy losses, therefore, must ordinarily be preceded by a reduction in the other costs of housing occupancy.

The foregoing discussion reveals that the redevelopment project occupancy costs which are most susceptible to reduction are those arising from (1) real estate taxes, (2) land costs, (3) mortgage interest, and (4) return required on the equity investment.

EXISTING LEGISLATION

Practical means for effecting the aforementioned reductions in the occupancy costs of redevelopment projects are available in existing state and federal laws, particularly the former. The state laws, which provide the most immediate opportunity for initiating redevelopment programs, comprise the municipal housing authority laws and the urban redevelopment corporation laws. Municipal housing authority laws provide one means for reducing the cost of housing occupancy through (1) abatement of real estate taxes, (2) lowering of the required rates of mortgage interest and equity return, and (3) reduction in vacancy losses.

Housing authority laws authorize municipalities to exempt projects of local housing authorities from local

ARCHITECT'S CONCEPTION OF A PROPOSED REDEVELOPMENT PROJECT IN DETROIT
Average Density Is 40 Units per Acre

Eggers and Higgins, Architects

real property taxes. Payments in lieu of taxes are authorized provided that these payments do not exceed the taxes levied against the property at the time of its acquisition. On a monthly basis, the taxes per room on the project used in the example would be $0.91 if the project were owned by a local housing authority as compared with $3.64 if the project were privately owned, a difference of $2.73 per room per month. The interest rate on housing authority mortgages would probably be close to 2% because of the exemption of the interest on housing authority securities from income taxes. For the same reason the required return on the equity investment probably would be less than that obtaining for a comparable investment of a private corporation. Thus, the required rate of return for an equity security of a housing authority might be 4% or less, as compared with 9% for a private corporation. The resulting reductions in the required average rate of return permit a saving of $3.39 per room per month after allowing for the increased amortization payment required to maintain the same retirement schedule at the lower interest rate.

As a result of the foregoing savings, vacancy losses would decrease owing to the wider market for these lower-rent dwellings. At these lower rentals, the vacancy cost probably would not exceed 6% of the total revenue, or $0.90 per room per month as compared with $2.24 in the private project.

In summary, therefore, savings of $7.46 per room per month could be effected by having the illustrative project owned and operated by a local housing authority, rather than by an unaided redevelopment corporation (see Table II). As a result of these savings, the required rent in the illustrative project could be reduced to $14.93 per room per month.

OTHER MEANS OF COST REDUCTION

Further means are available for reducing the required rental to $11.50 per room per month or less. Among these are the following:

1. A reduction in the annual fixed charges on the land cost through the issuance of deferred amortization revenue bonds. As compared with conventional financing, these bonds would reduce the annual fixed charges on the land investment by almost 75%. On a monthly basis, the cost per room would thereby be decreased from $3.31 to $0.91.

2. A reduction in the proportion of equity financing through the issuance of a mortgage insured by the Federal Housing Administration. This permits a decrease in the proportion of high-cost equity capital required, and a reduction of the interest rate as a result of government guarantee of the mortgage.

3. Development of non-residential sources of income. The income from the leasing of stores and garages and from the submetering of utilities can provide as much as 15% of the total revenues of a project. In this way, a sizable reduction in the required residential rentals can be effected.

REDEVELOPMENT CORPORATION LAWS

Some 20 states have enacted legislation purportedly designed to enable private enterprise to engage in urban redevelopment. With only four exceptions, however, these laws fail to provide any means for accomplishing this objective. In particular, they afford no means by which private enterprise can effect the reductions in the costs of housing occupancy which are prerequisite to any extensive redevelopment program. Generally the only benefit they accord private developers is assistance in land assembly.

Under the urban redevelopment laws of New York, New Jersey, Massachusetts, and Wisconsin, however, municipalities are authorized to exempt redevelopment projects from local taxes. In four states, therefore, urban redevelopment corporation laws provide some of the implementation necessary to make the reconstruction of blighted areas an economically feasible undertaking for private enterprise. As a practical matter, the extent to which this legislation will be utilized depends largely upon the encouragement and cooperation given private developers by the local officials responsible for administering these laws.

Immediate and practical means for initiating urban redevelopment programs are now available in municipal

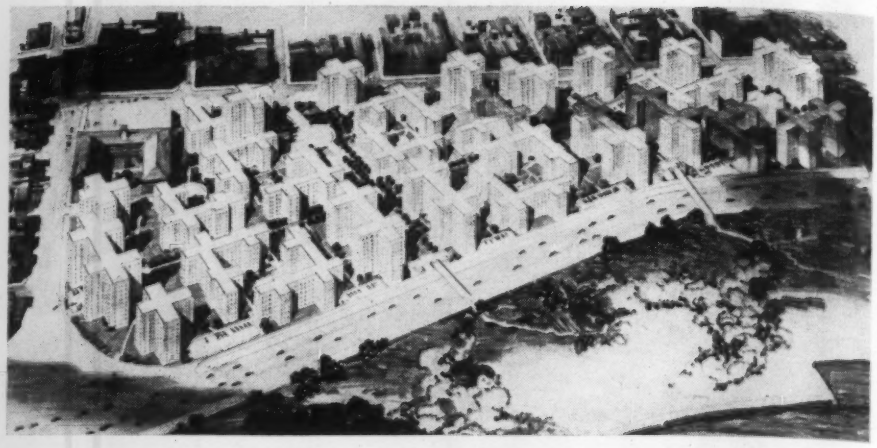
housing authority laws and in certain urban redevelopment corporation laws. To further implement and expand these instrumentalities, however, the enactment of a broad program of state and federal legislation is required. The objectives of this legislation should include the provision of means for (1) effecting reductions in the costs of housing occupancy, (2) rehousing displaced occupants of low income, and (3) encouraging private capital to enter the field of urban redevelopment.

STATE AND FEDERAL LEGISLATION

In order to achieve the foregoing objectives, state legislation should be enacted to provide for:

1. Exemption of redevelopment projects from local real estate taxes.
2. Exemption of the securities of redevelopment corporations from income taxes.
3. Authorization for municipalities to acquire and sell or lease land in blighted areas for redevelopment.
4. Authorization for municipalities to issue revenue and general-obligation bonds for the purpose of assisting in the redevelopment of blighted areas, such assistance to include the acquisition of land, the furnishing of public facilities, and the making of loans to redevelopment corporations and housing authorities, particularly for the purpose of rehousing displaced occupants of low income.
5. Authorization for municipalities to guarantee the principal of, and interest on, any indebtedness contracted by redevelopment corporations or housing authorities.
6. Authorization for the state to make loans and grant subsidies to municipalities, housing authorities, and redevelopment corporations for urban redevelopment purposes.
7. Extension of all benefits granted to redevelopment projects to projects built on vacant land for the rehousing of displaced persons of low income.
8. Relaxation of the restrictions on savings banks, insurance companies, and other fiduciaries regarding the investment of their funds in the securities of redevelopment corporations.
9. Expansion of the concept of urban redevelopment to include the prevention and arresting of blight, and the reclamation of vacant and near-vacant areas incapable of adequate development without the assistance of the municipality in assembling the land or otherwise.

At the federal level, the U.S. Housing Act has provided the means for carrying out the only extensive program for rebuilding urban blighted areas which has been undertaken in this country. Under this program, however, only a minor fraction of our urban blighted areas has been redeveloped. The funds appropriated by this act for this purpose are now almost completely expended or earmarked.



Alfred Easton Poor and Voorhees, Walker, Foley and Smith, Architects.

PROJECT PROPOSED FOR A BLIGHTED AREA IN MANHATTAN, NEW YORK

To promote urban redevelopment, future federal legislation, like state legislation, should provide means for (1) reducing the costs of housing occupancy, (2) rehousing displaced persons of low income, and (3) encouraging private capital to enter this field. The following is an outline of some suggested provisions of such legislation:

1. Authorization for loans, grants, and subsidies to municipalities, local housing authorities and private groups for the purpose of providing housing for persons of low income, particularly for those displaced by redevelopment projects.
2. Authorization for loans to municipalities to enable them to acquire and then lease or sell land for redevelopment purposes, including vacant land needed for the rehousing of displaced persons of low income.
3. Exemption of the securities of redevelopment corporations from income taxation, provided they are regulated with respect to financial structure, rents, dividends, and other aspects of operation.
4. Authorization for the Federal Housing Administration to insure mortgages on redevelopment projects up to 85 or 90% of their appraised value.
5. Authorization for the Federal Housing Administration to increase the amount of insurable mortgage per room on redevelopment projects to take into consideration the high cost of land in blighted areas. At present, the maximum amount of mortgage which the Federal Housing Administration may insure is $1,350 per room. Since land and site improvements generally cost from $400 to $800 per room in redevelopment projects, and since present construction costs will approximate $1,500 per room in a typical project, it is evident that the maximum insurable mortgage comprises only from 60 to 70% of the total cost. An increase in the proportionate amount of the mortgage from 60 to 80% would double the amount of redevelopment possible with a given amount of equity capital.

COMMUNITY PLANNING

The foregoing outlines of suggested provisions of state and federal legislation are by no means complete. No mention has been made, for example, of legislative provisions relating to the integration of urban redevelopment with community planning, the designation of blighted areas, the assembly of land, the regulation of redevelopment corporations, or the administration of urban redevelopment corporation laws. The proposals outlined necessarily constitute only a small part of the legislative program needed to implement urban redevelopment programs.

It should be emphasized, however, that the redevelopment of blighted areas in most cities need not await additional legislation. The practical means for immediately initiating redevelopment programs are available in 39 states. The responsibility for developing and executing these programs rests largely with local officials. Unless these officials recognize their responsibility and utilize the existing legislation available to them, urban redevelopment will continue to receive more academic discussion than constructive action.

Model and Prototype Studies on Unique Spillway

Part III of Symposium on Fontana Dam Spillway

By A. J. PETERKA, Assoc. M. ASCE
ASSOCIATE HYDRAULIC ENGINEER, TVA, NORRIS, TENN.

MANY features of the Fontana Project are unusual. The dam, across the Little Tennessee River, rises some 470 ft above the river, and is thus the tallest east of the Rockies. Although the power station was built into the toe of the dam, the main spillway was tunneled through a rock abutment. To determine the operating characteristics of the outlet works, extensive model tests were made prior to completion of the design. In the year that has elapsed since the structure was finished, opportunity has been given to compare these model tests with prototype performance. This discussion by Mr. Peterka was first presented before the Tennessee Valley Section.

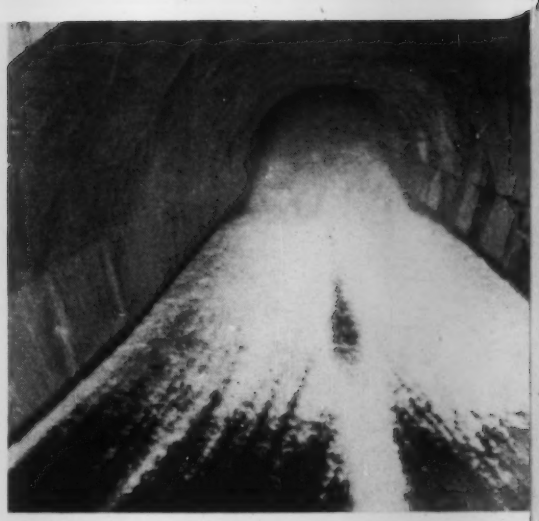
PRACTICALLY all the major dams and their appurtenances constructed in recent years have been subjected to hydraulic model tests before they were built. Models are used to prove or disprove the soundness of a particular design, to supply data for use in operating the prototype structure after it is completed, and to provide assurance that it will operate safely and efficiently over an extreme range of conditions as its designers intended. Usually emphasis is placed on model tests at high discharges, which occur in the prototype rather infrequently, and as a result a comparison of model and prototype performance is not possible. In the case of the main spillway at Fontana Dam, however, model tests were made not only for extremely high discharges but for low discharges that are likely to occur at any time.

Soon after the model tests were made, and even before the construction of the dam was completed, an opportunity arose to observe the operation of the prototype spillway and to compare its performance with that predicted by the model tests.

Tunnel discharges may consist of either spillway discharge, sluice discharge, or both. Spillway discharges pass over two separate crests above each tunnel and combine just before entering the tunnel to form a single stream. This stream then passes over the sluice outlets, near the upper end of the tunnel, before being discharged into the river.

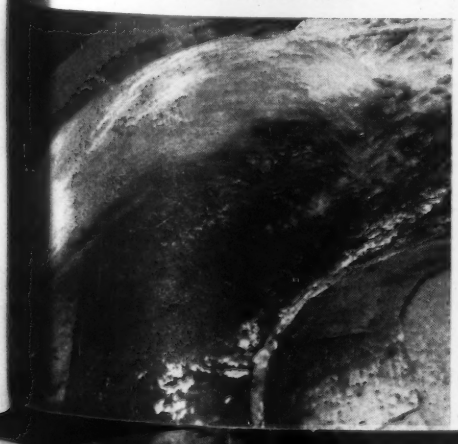
Sluice discharge may occur either with or without spillway discharge. Flow conditions at the junction of the spillways and in the vicinity of the sluice outlets were thus of particular interest. The operation of the buckets at the tunnel outlets was also of interest because of unique design.

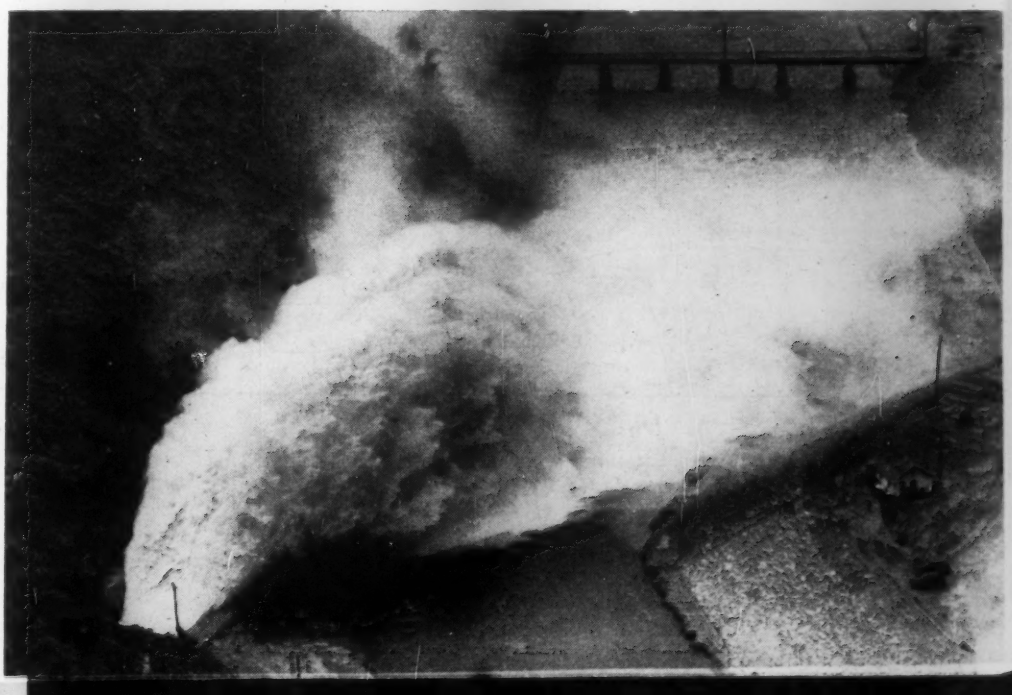
On June 16, 1945, conditions were found favorable for making tests to observe the operation of the main Fontana spillway with both sluices and spillway gates discharging. The maximum discharge that could be passed at that time was limited by the temporary construction bridge below the dam. Possibility that the bridge piers might be undermined made it inadvisable to discharge more than 20,000 cu ft per sec through the two tunnels. During the period of the tests, the radial spillway gates were opened fully to give a discharge of 2,500 cu ft per sec per tunnel with the headwater at El. 1680. In addition, the two outside sluices in each tunnel were opened, giving a total discharge per tunnel of 10,000 cu ft per sec. The performance of the outlet buckets was observed with each tunnel discharging singly and with both tunnels discharging together. The total elapsed time from opening to closing of the gates was a matter of about three hours.



FLOW ON SPILLWAY FACE AT DISCHARGE OF 2,500 CU FT PER SEC

For all combinations of spillway and sluice discharge, flow in the tunnels was entirely satisfactory. For spillway discharges, the flow passed over the crests as a clear, solid mass. Then, just as it entered the tunnel, its surface became aerated and white. With the exception of aeration, the water surface was relatively smooth, even after passing over the sluice outlets. For sluice discharges, flow entered the spillway tunnel smoothly but with a slightly rough surface. There appeared to be some aeration in the jets, probably due to the fact that the hydraulic grade line was below the top of the sluices at the air vents immediately below the sluice gates, and therefore air was being drawn into the sluices. With the spillway and sluices operating together, there was no interference where the discharges combined. In fact, it was difficult to tell whether the sluices were open or closed when the spillway was in operation.





TUNNEL NO. 1 (BELOW) IN MODEL, DISCHARGING 12,500 CU FT PER SEC AND (RIGHT) IN PROTOTYPE, DISCHARGING 10,000 CU FT PER SEC

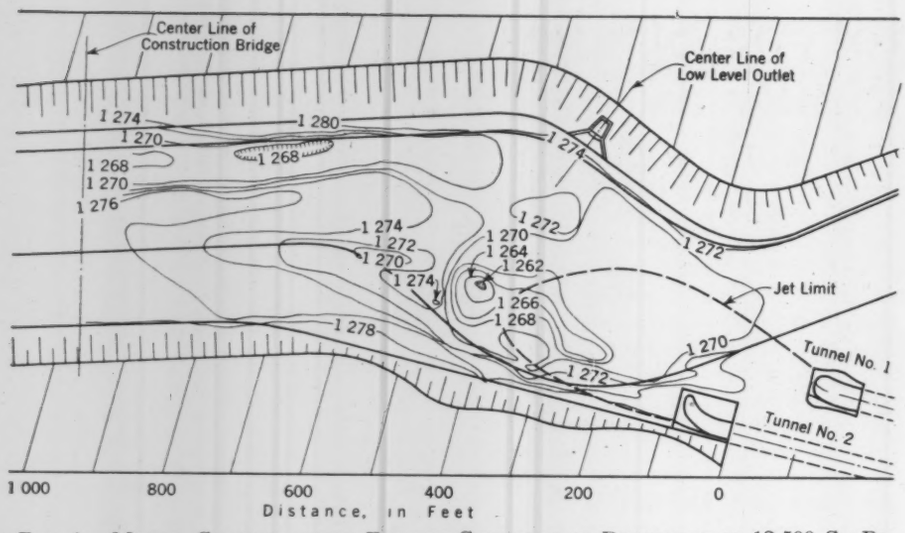


FIG. 1. MODEL CHANNEL WITH EROSION CONTOURS AT DISCHARGE OF 12,500 CU FT PER SEC PER TUNNEL

Tests on the model spillway had indicated that satisfactory flow conditions would obtain in the prototype for these discharges. However, the model did not indicate that aeration of spillway and sluice discharges would occur. In a small-scale model it is not possible to obtain surface aeration under normal conditions.

The buckets at the tunnel outlets are shaped to throw discharges into the air and spread them over an oval-shaped area. In the process some of the energy in the flowing water is dissipated and the remainder is spread over a relatively large area, thereby preventing undermining of the tunnel and reducing other river-bed erosion to a minimum. The bucket shapes were determined by model tests and it was found necessary, for satisfactory operation, to make them different. Each bucket was made to produce a pattern that covered considerable area for small discharges, and yet was confined within the river banks for larger flows. For higher discharges the areas overlap but the jets do not conflict. The river banks are an integral part of the energy-dissipating structures since they were realined in places to reduce the scouring tendencies of eddies induced by the discharges from the tunnels.

It was known from the model tests that discharges up to between 1,000 and 1,500 cu ft per sec would not spring free of the bucket lip and that the buckets would act as broad-crested weirs. The program of gate operation did not permit a determination of the minimum discharge that would spring free of the prototype buckets. However, it was noted that the flow left the prototype bucket before a discharge of 2,500 cu ft per sec was reached. This is the lowest discharge that was held steady for any length of time. When it is possible to operate the spillway at lower discharges for a length of time great enough to allow uniform conditions to be established throughout the tunnel, the exact discharge at which the flow leaves the bucket may be determined.

The surface of the water emerging from the tunnels was well aerated, and a considerable amount of spray was apparent above the surface. At times, however, the spray broke sufficiently to disclose solid water beneath. Measurement of the elevation of the top of the solid water indicated that it was about 5 ft above the tunnel invert for a discharge of 10,000 cu ft per sec. The corresponding velocity was 120 ft per sec. As the water was turned upward and left the bucket, it appeared to break completely into spray, no solid water being visible. The water was thrown about 150 ft vertically into the air.

The passage of water through the tunnels at a velocity of 120 ft per sec, or about 82 miles per hour, created considerable wind velocity in the tunnels. An anemometer held in the air stream registered a mean velocity of 42 miles per hr, and intermittent gusts as high as 53 miles per hr. Below the buckets the expanding jets also set in motion a large mass of air which carried large amounts of spray from the jets toward the temporary buildings on the right bank of the river. The effect in this area was that of a heavy wind and rain storm. The average wind velocity, measured by anemometer, was 27 miles per hr for the maximum discharge, with gusts up to 40 miles per hr. Higher velocities were reported to have occurred near the end of the construction bridge, but no actual measurements were made at that point. Considerable spray also drifted down the left bank but at no time was any spray visible or otherwise evident in the vicinity of the power house or switch yard. Since both are located upstream from the buckets, it is believed that they will be protected from spray at all discharges.

Accompanying photographs show the performance of the outlet buckets for various discharges both in the model and in the prototype. It is apparent that, in general, model and prototype operation are similar. However, certain differences are apparent. The model jets are not as thoroughly broken up as those in the prototype and no spray is visible in the model. This difference, like lack of aeration on the model spillway face, is due to the fact that surface tension in the model and that in the prototype are the same, while the forces tending to

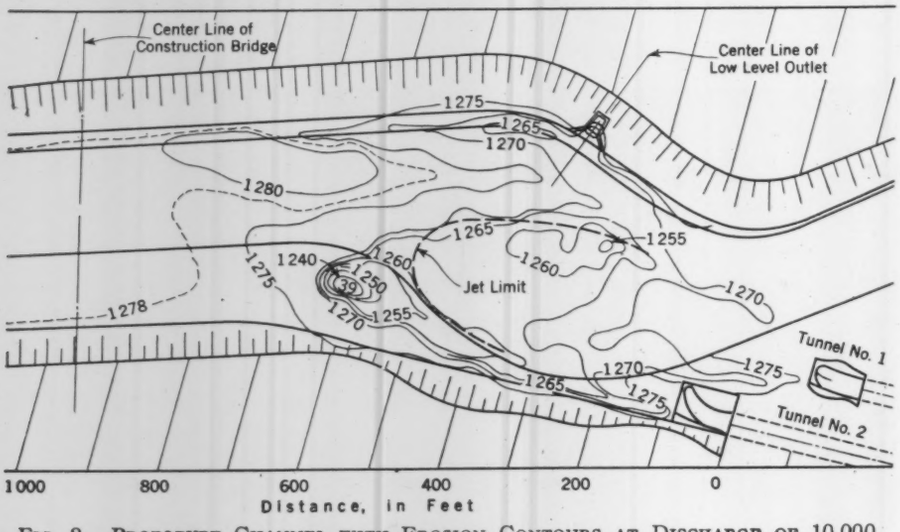
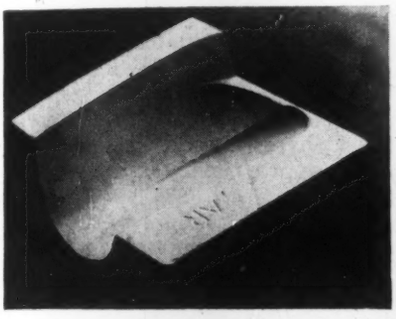


FIG. 2. PROTOTYPE CHANNEL WITH EROSION CONTOURS AT DISCHARGE OF 10,000 CU FT PER SEC PER TUNNEL

BOTH TUNNELS DISCHARGING (ABOVE) IN MODEL AT A DISCHARGE OF 12,500 CU FT PER SEC FROM EACH TUNNEL; (RIGHT) IN PROTOTYPE, AT A DISCHARGE OF 10,000 CU FT PER SEC FROM EACH TUNNEL

break up the jets are greatly different.

The agreement between model and prototype jets is better for tunnel No. 2 than for tunnel No. 1. The jet from tunnel No. 1 in particular appears to be somewhat shorter in the prototype than in the model. Figures 1 and 2 show the jet lengths obtained by actual measurements. It will be noted that here too the model shows a longer trajectory than the prototype. Some of this difference is no doubt due to the larger discharge in the model, and the remainder, if any,

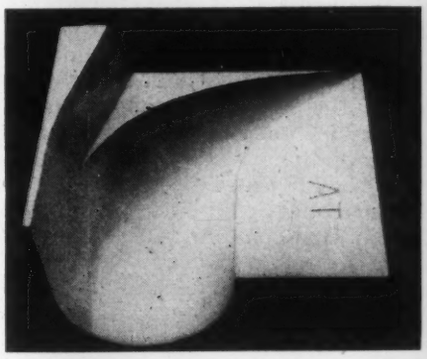


MODELS OF BUCKETS USED AT OUTLET 1 (ABOVE) AND AT OUTLET 2 (RIGHT)

may be due to the greater resistance offered the bulkier prototype jet.

During the model tests it was noted that a lowering of the tailwater elevation in the channel below the power house occurred for all discharges. The amount of the reduction depended on the discharge and on the configuration of the river bed, which of course varied as the test progressed. Consequently, comparative figures for model and prototype are not available but the fact that an actual lowering of the tailwater occurred at the power house is confirmation of the tendency indicated by the model. The average tailwater elevation before the tests was 1277.7. The lowest tailwater elevation during the maximum spillway discharge was 1276.3, a reduction of 1.4 ft. This reduction in tailwater occurred even though the river discharge had increased 20,000 cu ft per sec.

Cross sections of the river bed below the spillway were made both before and after the prototype discharges and showed that some scour had occurred. About 14,400 cu yd of material were removed from the river bed during the period of the tests and deposited further downstream. Model tests to determine the depth and extent of the scour were made in a sand bed molded to the shape of the river channel to a scale of 1 :100. The sand was specially treated and tamped into place so that it did not slump under water. Because of differences in the material composing the river bed in the model and prototype, and the limited



amount of prototype data available, it is not possible to make satisfactory quantitative comparisons of erosion, particularly with respect to time. However, Fig. 1 shows the erosion produced in the model for a discharge of 12,500 cu ft per sec per tunnel, and may be compared with Fig. 2, which shows erosion in the prototype for a discharge of 10,000 cu ft per sec per tunnel. The shapes of the eroded areas are in general very similar, and in both model and prototype the deepest erosion occurred some distance downstream from the jet limits. The location of the scour pattern for the prototype operation is very much like that for the model at 5,000 cu ft per sec, although the discharge was much closer to that of the model test at 12,500 cu ft per sec. It is apparent, however, that the prototype erosion was not as deep as that shown in the model at the same point for 12,500 cu ft per sec.

Since the model tests were run until scour ceased, the amount of material moved during the prototype tests was a great deal less than that indicated by the model tests for the same discharge. Consequently the deposits in the river bed below the eroded area are correspondingly less. Also, although the deposit that occurred in the prototype encroached on the tailrace channel, the model tests indicated that this material would ultimately lodge against the right bank, filling the tailrace channel completely.

In examining the details of the erosion tests, the most significant feature of the tests should not be overlooked. In spite of the erosion that occurred, no material was removed from the area adjacent to the structures, and in this respect the prototype performance confirmed the model tests.

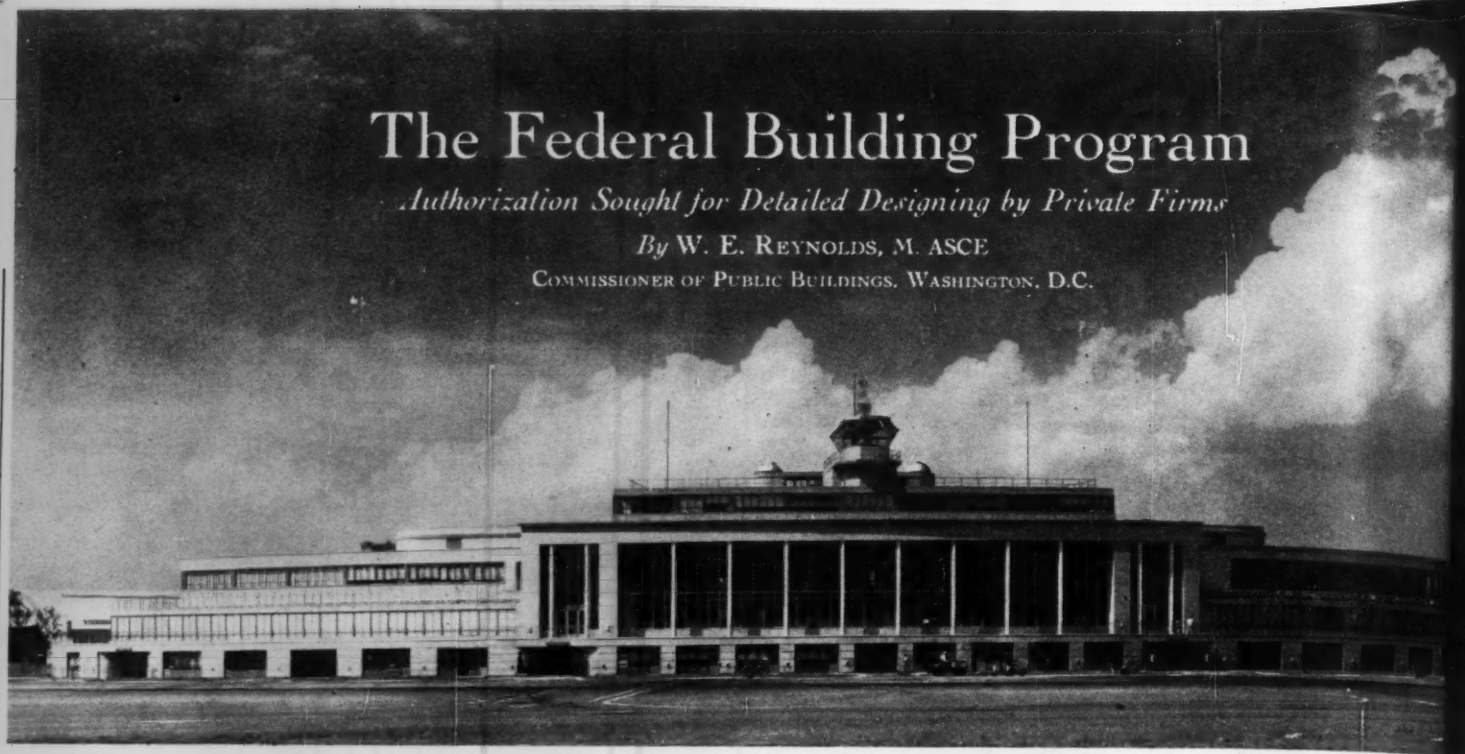
A careful examination of the linings of the tunnels was made after completion of the tests. Particular attention was given to joints and other irregularities that might have offered starting points for erosion. Some loose material had been washed away from joints but there was no damage to sound concrete. The tunnel lining suffered no damage whatever. A thin layer of concrete had been removed from a very small area in bucket No. 2. This layer was apparently not bonded to the body of concrete below and appeared to be separated from it by a thin layer of laitance. In contrast, fragments of muslin, which was used on the forms and had adhered to the concrete, were still in place after water had passed over them for two hours at a velocity of 120 ft per sec.

The Federal Building Program

Authorization Sought for Detailed Designing by Private Firms

By W. E. Reynolds, M. ASCE

Commissioner of Public Buildings, Washington, D.C.



Administration Building, Washington National Airport at Gravelly Point, Va., Built in 1940

OBEDIENT to the principle of "first things first," the present intention of the government is to channel construction materials and labor into low-cost housing, especially housing for veterans. This policy is dictated by existing critical conditions; but on its merits it is a sound one, and in no wise at variance with the long-established and often stated policy of the Public Buildings Administration, namely, that the Government should not enter the construction market at a time when private industry needs the labor and materials. This policy was stated while the war was still in progress and has been frequently reiterated since, both to the press and in my testimony last fall before the House Committee on Public Buildings and Grounds, which was then considering the general building program of the Public Buildings Administration, embodied in H.R. 4276, introduced by Chairman Fritz G. Lanham of Texas.

For the present this bill, which listed "eligible" projects throughout the continental United States and our territories, is being held for further consideration, and an interim bill, H.R. 5407, was passed by the House on March 18 and at this writing is awaiting action by the Senate. The public has difficulty in distinguishing between authorizations, such as were contemplated by H.R. 4276, and appropriations, which must be sought in separate legislation before the Public Buildings Administration is empowered to begin actual construction. The latter we have no desire to do on a general scale until conditions in the building industry and in the labor market appear favorable.

The interim bill, among other provisions, authorizes for construction only the extensions to the Marine Hospitals at Seattle and San Francisco, and authorizes an increase in the limit of cost of the West Central Heating Plant in the District of Columbia.

The provision of the interim legislation which is of chief interest to the members of the American Society of Civil Engineers is that portion of Section 1 whereby authority would be granted "to establish the limits of cost and design new building projects where the sites are in Government ownership, notwithstanding the fact that appropriations for construction work shall not have been made."

This language would permit the Public Buildings Administration to embark on an advance planning program for essential federal buildings in all parts of the country where sites are in Government ownership. Architects and engineers could be put to work at drawing plans and writing specifications, so that a considerable number of projects could be advanced to the point of advertising for construction bids. As stated, these projects would be withheld from the market, as federal building on a wider scale would not be undertaken until it was judged in the national interest to do so.

It will be recalled that in the depression years before World War II, public construction was not effective in creating jobs and cushioning our economic decline, so recourse was had to "made work." As any member of the ASCE knows, it takes many months to design a major federal building and produce the final working drawings and specifications for it. Under previous legislation such plans and specifications could not be started until after the Congress had appropriated funds for construction of the project.

Under the interim legislation, a shelf of completely planned projects could be accumulated so that the Public Buildings Administration would be in a position to start construction without delay whenever the Congress deemed this expedient and appropriated the necessary funds.

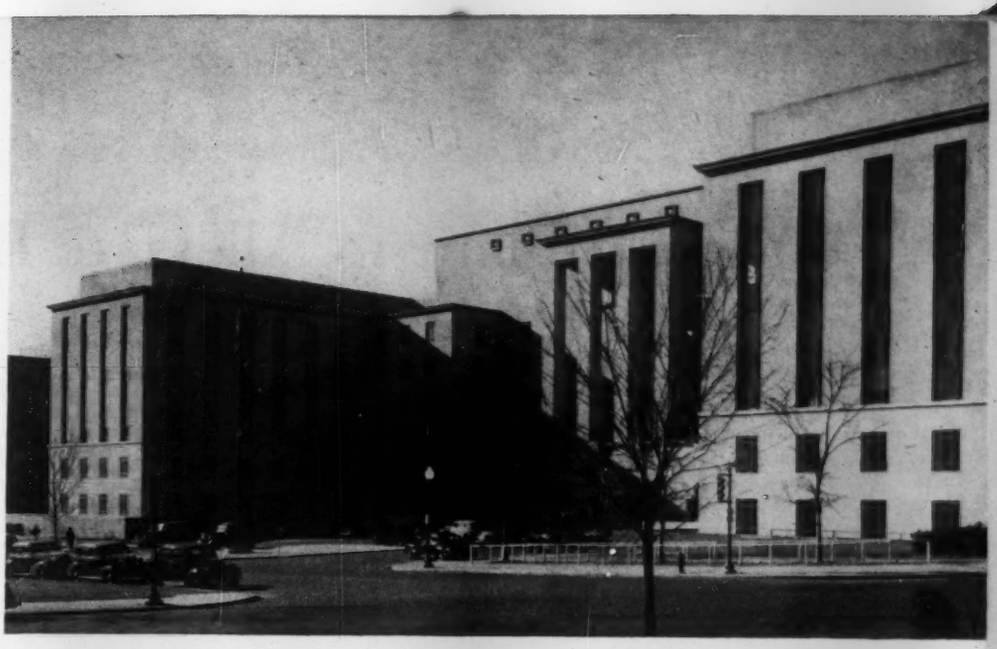
The Public Buildings Administration intends to employ private architects and engineers on a portion of its proposed pre-planning program. It is judged unwise to build up a large organization of architects and engineers in Washington, most of whom must be dismissed when the work load is past. A better public policy is to distribute the federal expenditure for designing and planning among architects and engineers throughout the country and not concentrate it on a Washington payroll.

Contracts will be negotiated with local architects for full architectural services, including engineering, up to the point of advertising for construction bids. It is not contemplated that the large architectural firms exclusively will be engaged; the smaller and younger firms, if qualified, will have their share of the work if and when the Congress passes the interim legislation. Under the form of contract that is now being drafted, the Public Buildings Administration proposes to pay the private architect a portion of his fee as certain successive steps in the preparation of the plans are completed. This procedure would ease his financial burden, since he

would not have to carry the entire cost of production as he would if his fee were withheld until his work was finished.

To assist the private architects and engineers, the Public Buildings Administration has in preparation a series of manuals that will be available to the two professions. These manuals will state the Public Buildings Administration's standards and recommendations for the design of federal buildings and their equipment, based upon many years of experience not only in designing and constructing, but in repairing and managing federal buildings. All these manuals have been drafted and are now being reviewed for technical accuracy and edited for clarity of statement. It is expected that they will begin to appear during this present year of 1946. The list of titles is as follows:

Drawing Requirements (Architectural, Structural, Mechanical)
Procedural Instructions for Contract Architects
Architectural Planning and Design
Specifications and Estimates
Mechanical and Electrical Engineering
Structural Engineering
Site Planning and Landscape Architecture
United States Post Offices
Post Office Garages
United States Courts
Hospitals
Appraisers Stores and Custom Houses
Field Quarters for the Bureau of Internal Revenue
Field Quarters for the Federal Bureau of Investigation
Field Quarters for the Immigration and Naturalization Service



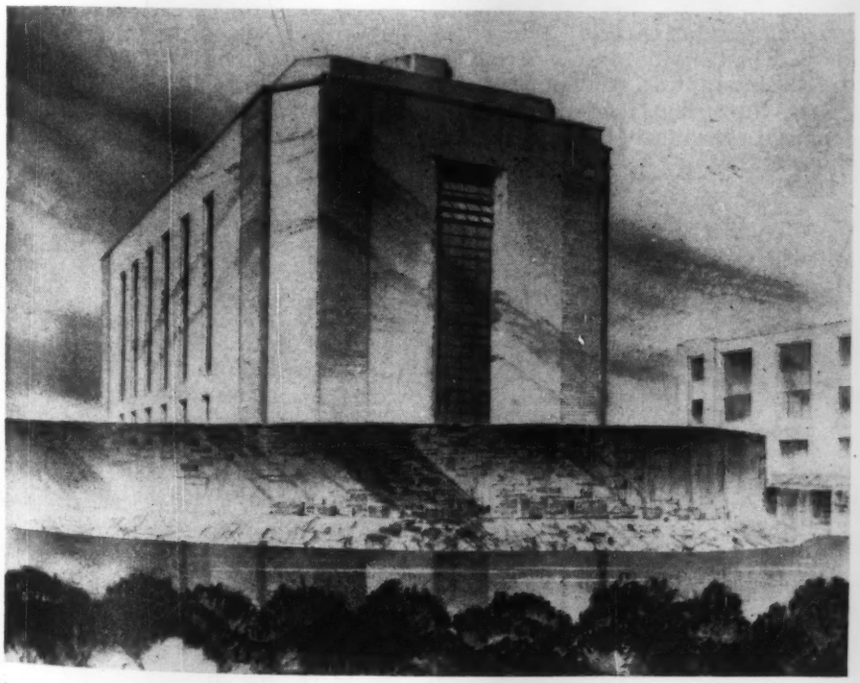
WAR DEPARTMENT BUILDING, WASHINGTON, D.C., COMPLETED IN 1941
Designed by Supervising Architect's Office, Aided by Two Consulting Architects—William Dewey Foster and Gilbert Stanley Underwood (Mr. Underwood Is Now Supervising Architect, Public Buildings Administration)

These manuals will not "freeze" design and construction, or entangle the professions in red tape. On the contrary, the manuals will provide the information necessary to enable the professions to do business with the Government more easily and satisfactorily. They will state the minimum standards that must be met in construction and equipment and will explain in detail the special requirements of the various departments and agencies. Sample plans will be included to illustrate the typical arrangements and relationships of space that the tenants prefer and that the Public Buildings Administration recommends in post offices, courthouses, and other federal buildings. Since architecture and engineering are constantly changing and progressing, it is planned that the manuals will be amended frequently to keep pace with all sound advances. The Public Buildings Administration intends to cooperate very closely with contract architects and render them every aid it can devise, based on experience to make their work for the government simpler and productive of the finest buildings that available funds will permit.

Several general considerations will influence the design of new federal buildings. The first is adaptability. Few government agencies stay put during the life of a building. They shrink, they expand, they move out. The contract architects and engineers must design buildings with all possible adaptability. Permanent partitions should be kept to a minimum.

The second point is capability of extension. The plans must anticipate future additions, to be built horizontally if the land is cheap, vertically in congested areas where land is costly.

The third consideration is more frequent resort to block buildings. The advances in air-conditioning, illumination, and acoustical engineering will make it profitable to construct buildings without wings or courts. The inside areas are cheap to build and quite acceptable for files, storage, and certain types of working space. Not all buildings should be so constructed, but the plan should have greater application than it has had in the past.



Wm. Dewey Foster Architect

WEST CENTRAL HEATING PLANT, WASHINGTON, D.C.
Contract for Completion Let in February 1946

Disposal Plant to Alleviate Boston Harbor Nuisance

I. Existing Facilities to Be Used in Primary Treatment

By KARL R. KENNISON, M. ASCE

CHIEF ENGINEER, METROPOLITAN DISTRICT WATER SUPPLY COMMISSION, BOSTON, MASS.

THE sewage treatment plant of the Boston South Metropolitan District at Nut Island, Quincy, Mass., is the first of a number of sewerage projects of the Metropolitan District Water Supply Commission on which the Massachusetts State Legislature has given the go-ahead signal.

Effect of the new project will be to improve conditions in Boston Harbor, a natural recreational area for the forty or more cities and towns in metropolitan Boston. The harbor receives on the average a discharge of over 250,000,000 gal of raw sewage daily. For a number of years there has been agitation for the improvement of this condition.

THREE MAIN SEWAGE OUTLETS

The situation is indicated on the harbor plan, Fig. 1, which shows the inner harbor confined west of the 3-mile-wide entrance between the peninsula of Hull on the southeast and Deer Island on the northwest. The shores on the inner side of Nantasket, in Hingham, Weymouth, Houghs Neck, Quincy, Squantum, Dorchester, South Boston, East Boston, Winthrop, and along some of the islands, are generously lined with bathing beaches on which many of these municipalities have spent a considerable amount for improvements. The three main sewage outlets are as follows:

WITHIN a short distance of some of the most popular beaches along Boston Harbor, vast amounts of untreated sewage are dumped into the tidal waters. To eliminate the hazard to public health a new treatment works will soon be under construction. Details of the new plant were described by Mr. Kennison before the recent meeting of the Sanitary Engineering Division. A second part of the paper, dealing with the disposal of solids, will appear in the May issue.

1. The Moon Island outlet of the old main drainage system of the City of Boston. This is located about in the center of the inner harbor and within one to three miles of some of the most populous beaches. Here the raw sewage is discharged only on the outgoing tide. Otherwise conditions would be much worse, and would long ago have become intolerable.

2. The Deer Island outlet of the North Metropolitan system. The discharge here is continuous, but into President Roads, the main channel entering Boston harbor. This channel is over 60 ft deep and, except on the incoming tide, the outlets discharge through it toward the broad expanse of the outer harbor of Massachusetts Bay.

3. The Nut Island outlet of the South Metropolitan sewer. Here also the discharge is continuous. Although the two outfalls in ordinary use extend about 6,000 ft off shore, the point of discharge is still about three miles from the outer harbor and as near to some of the beaches as the Moon Island outlet.

PRESENT PLANT AT NUT ISLAND CONSISTS OF A RACK HOUSE WHERE LARGER SOLIDS ARE REMOVED FROM THE SEWAGE

PARTIAL TREATMENT CHOSEN

The State Department of Public Health has spearheaded the investigations of harbor conditions made over the last 10 years. In spite of the fact that grease and other floating matter characteristic of sewage frequently reach the bathing beaches, it has concluded that the great dilution, fortunately possible in Boston Harbor, permits a natural purification by oxidation of the organic matter. In fact, the harbor waters have contained oxygen in not less than 57% saturation. This makes a high degree of purification unnecessary.

In 1941 and in 1945 the State Legislature appropriated $15,000,000 for the design and construction of the following projects: (1) A sewage treatment plant and appurtenant works at the Nut Island outlet of the South Metropolitan trunk sewer. (2) An extension to Deer Island of a North Metropolitan relief sewer recently completed as far as East Boston, and a sewage treatment plant (design only) and appurtenant works at the Deer Island outlet. (3) Conduits and other works to correct conditions of pollution along Alewife Brook in an area tributary to the North Metropolitan system. (4) Conduits and other works to provide relief from storm overflows into the Charles River Basin from the South Metropolitan side. (5) Conduits and other works to provide relief from storm overflows into the Charles River Basin from the North Metropolitan side.

NUT ISLAND WORKS

A flow diagram of the Nut Island Sewage Treatment Plant at the outlet of the South Metropolitan sewer is shown in Fig. 2. This plant is designed to remove floating solids and

INTO THE BLUE WATERS OF BOSTON HARBOR FLOWS RAW SEWAGE FROM NUT ISLAND OUTLETS

grease; to reduce the amount of suspended solids (to such an extent as can be economically done in sedimentation tanks of about a $1^1/_2$-hour detention period, at the design rate of flow, preceded by about 20 minutes of aeration); to materially reduce bacterial pollution of the harbor and shore waters by chlorination of the effluent during the recreational season; to digest the sludge and utilize the gas therefrom for low-lift pumping and other plant needs; and to discharge the digested sludge through an outfall pipe to tidewater facing the outer harbor, across the deep channel from the Deer Island outlet of the North Metropolitan trunk sewer. The plan also contains an optional provision for unwatering a small portion, not over 10%, of the digested sludge to allow its recovery as low-grade fertilizing mulch. This last provision is in the nature of an experiment anticipating needs of the Parks Division of the Metropolitan District Commission and also of others.

PRINCIPAL FEATURES OF DESIGN

The present trunk sewer terminates in two parallel channels originally intended as sand catchers, but ineffective and not now used as such. The design of the new works takes advantage of the existence of these sand catchers by using the westerly one as a bypass during construction, and breaking into the other only to such an extent as is necessary to take off the influent and return the effluent. The design also utilizes the existing outfalls for the discharge of the plant effluent and includes the construction of diffusers over the submerged outlets of the two main outfalls. Other existing facilities to be used include two vertical boilers in excellent condition, served by a chimney 100 ft high; control gates and other equipment.

Design rate of the Nut Island plant is 112 mgd, from a contributing population of 900,000. The maximum rate used in the design is 300 mgd, this being the limiting capacity of the existing trunk sewer. Plans for the future do not contemplate any enlargement of this main feeder, the conclusion drawn from the report of the board of consultants being that this long trunk sewer will continue to serve for a more or less indefinite period and that any future additional needs of the South Metropolitan area can be taken care of more economically by a relief diversion through the North Metropolitan system to the outlet at Deer Island. The present average rate of sewage flow is about 95 mgd from a contributing population of 700,000. The normal dry weather, or summer, rate of flow, corresponding to the design rate of 112 mgd, is expected to be about 90 mgd.

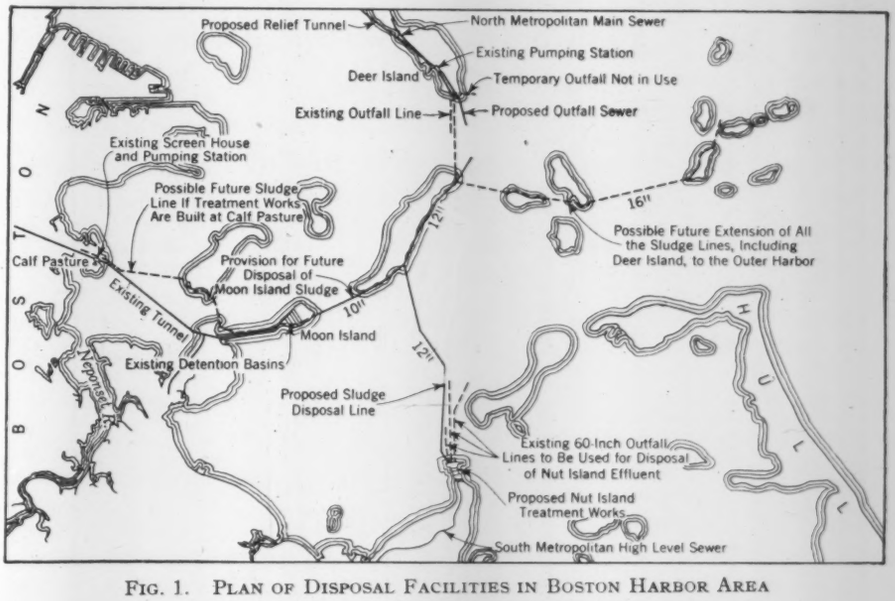

Proposed Relief Tunnel
North Metropolitan Main Sewer
Existing Pumping Station
Deer Island
Temporary Outfall Not in Use
Existing Outfall Line
Proposed Outfall Sewer
Existing Screen House and Pumping Station
Possible Future Sludge Line If Treatment Works Are Built at Calf Pasture
16"
12"
Possible Future Extension of All the Sludge Lines, Including Deer Island, to the Outer Harbor
Calf Pasture
Provision for Future Disposal of Moon Island Sludge
Existing Tunnel
10"
Moon Island
12"
Existing Detention Basins
Proposed Sludge Disposal Line
Existing 60-Inch Outfall Lines to Be Used for Disposal of Nut Island Effluent
Proposed Nut Island Treatment Works
South Metropolitan High Level Sewer
BOSTON HARBOR
HULL

FIG. 1. PLAN OF DISPOSAL FACILITIES IN BOSTON HARBOR AREA

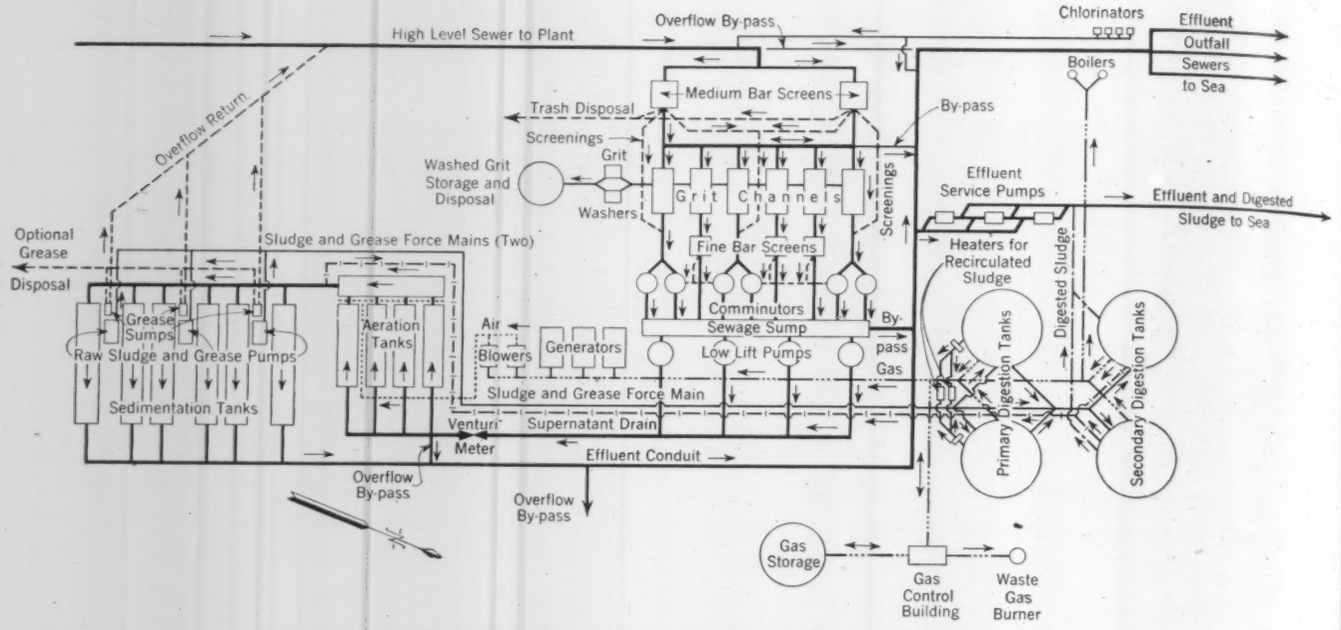


FIG. 2. FLOW DIAGRAM OF NUT ISLAND SEWAGE WORKS

For about $2^1/_2$ years, composite 24-hour samples have been taken, usually every 8 or 9 days, and analyzed with the assistance of the State Department of Public Health. These samples indicate that the suspended solids vary ordinarily from about 100 to 300 ppm. The weighted average of these figures is about 165 ppm, including about 40 fixed, and the design computations are based on 0.2 lb of suspended solids per capita per day, or a total design rate of 180,000 lb, and 140,000 lb at present. Samples analyzed for a limited period showed a B.O.D. varying ordinarily from about 75 to 300 ppm.

By taking off from a point in one of the old sand catchers and returning the effluent to the same location, it is possible to construct a bypass of the entire plant by means of an emergency spillway at this point. From this spillway, existing outfalls discharge the settled effluent directly to tidewater about 6,000 ft offshore. Thus the sewage level is sensitive to tidal fluctuations as well as to variations in friction loss with changes in the rate of flow.

DESIGN OF SPILLWAY CREST

It is necessary to anticipate the possibility of occasional extreme high tides coincident with high rates of flow, which would indicate a high spillway level, limited only by the economical height to which the sedimentation basins and their overflows can be raised. This limit has been set to allow the maximum rate, 300 mgd, to be put through the plant and discharged through the existing outfalls at high tide, with a minimum of dependence on any other offshore outlet. It is also necessary to place the main emergency spillway crest low enough so that it can operate effectively as a plant bypass without backing up the sewage to excessive heights in the trunk sewer.

These two necessities are met by installing in each of seven bays on the spillway crest a tide gate. Each gate is a thin steel shutter with a 5.75-ft span and a height of only about 2 ft. This shutter swings as on a hinge in the bottom of the access grooves. Its upper edge is rounded to form a supplementary crest such that extremely high rates of flow can be divided, a part going over the upper crest.

RACKS AHEAD OF GRIT REMOVAL

The Nut Island design provides for mechanically cleaned racks of a type similar to those used in New York's Manhattan grit chamber. This consists of a battery of slender rods which are somewhat flexible and are supported and spaced by the teeth on the rakes. The advantage of this design is that the rakes operate from the downstream side in such a way as to eliminate any tendency to jam the material either at the bottom or at the top of the effective waterway opening. With this type of rack, it is not considered necessary to have any preliminary coarse hand-cleaned rack. However, space is provided for the removal by hand of any bulky objects that are churned around by the teeth but fail to be lifted.

Although these racks are placed ahead of the grit channels and take the place of the ordinary coarse rack, the clear space between rods is only $1^1/_2$ in. On that account they might better be called medium racks than coarse racks. This spacing is designed to increase the removal of rags at this point and thereby to lessen the difficulty that might be caused by clogging of the grit-collecting mechanism with such material. There are two of these medium racks, one in each of the approaches to the waterway that feeds the grit channels (Fig. 2).

There is no provision in the design for complete mechanical handling of the material removed from these racks, since it is believed that in any event some manual sorting will be required at this point. Material is dropped on a sorting table from which tin cans, bottles, rubber balls, and any other material that should not be sent through the works can be removed manually. Also rags and other such material can be dropped into wells in the floor in the path of jets of sewage effluent, which will carry them along in sluicing lines and return them to the sewage flow after bypassing the grit channels.

GRIT REMOVAL

The design for the grit-removal mechanism includes six parallel channels 80 ft long and $10^1/_2$ ft wide, with collectors of standard type that scrape the material from the downstream to the upstream end and elevate it to a cross conveyor. The grit washing and storage tower at one side of the building contains two units of the jig type, fed by a screw conveyor made reversible in order to permit use of either washer. The washed material is carried by bucket elevator to

a 75-cu yd storage bin near the top of the tower. Provision is made for loading trucks at the ground level from the tank hopper, also for agitating the stored, washed grit to facilitate its removal from the hopper.

COMMINUTORS AND FINE RACKS

A sluice gate at the entrance to each grit channel provides selective operation. Ordinarily only two or three of these channels will be in use, but sometimes four—when the rate of flow exceeds 140 mgd. At the outlet ends of each of the three channels selected for ordinary use two 36-in. comminutors are installed, making six in all. Provision is made for unwatering each comminutor separately for maintenance purposes, but the two opposite-hand units will always be operated in parallel whenever the contributing grit channel is in use.

Two comminutors are used in each channel because a single unit would require greater fluctuation in the hydraulic gradients involved and would not fit into the rest of the design as satisfactorily as do the two units; also because the size and cost of single units were considered excessive in view of the difficulties in securing extreme shaft rigidity. The conclusion to use twin machines was reached in spite of the fact that the manufacturer is willing to guarantee the satisfactory performance of the larger units.

The other three grit channels discharge through fine racks. These are of the same type as the medium racks at the head of the works and use slender rods of the same diameter, but with only a $^1/_2$-in. clear spacing. The material raked from the rods of these fine racks is automatically discharged into wells below the floor level and into the path of jets of sewage effluent in much the same way as that from the medium racks. In other words, all the material sluiced from all the racks is emptied into the sewage flow ahead of the comminutors, the design being based on the capacity of this equipment to satisfactorily handle the screenings from the entire six-channel flow.

MAIN LOW-LIFT PUMPS

The four main low-lift pumps take their suction from a sump in the basement which is baffled to minimize short circuiting or pocketing in corners, where solids might settle out and collect. In this sump the normal depth of sewage is 8.25 ft, and the net area of the sewage surface is about 1,020 sq ft; and in operation this sump will always be connected to at least two of the grit channels, having a surface area of about 840 sq ft each. Operation is designed to maintain a fairly constant level in the sump. An emergency bypass direct from the sump to the main effluent conduit is controlled by a 6- by 6-ft sluice gate. During such emergency bypassing, a great deal of the most objectionable floating matter would be removed by the continued operation of the medium racks, grit channels, and fine racks—with temporary storage of the screenings.

NEW TREATMENT PLANT WILL TAKE FORM ON FILLED LAND AT SITE OF PRESENT NUT ISLAND OUTLET

VENTURI METER FOR INFLUENT

Discharge lines from the pumps converge into the influent conduit, which contains a venturi meter of special design, in which all piezometer connections are on the sides and none on either the top (where they would tend to be fouled with grease or other light material) or the bottom (where they would tend to become clogged with heavy material). The upstream approach is 10 ft in diameter, and its battery of piezometer connections is contained in a single bronze plate on one side only, it being considered unnecessary to have dual connections, one on each side. Access for flushing or rodding is provided by a well of 54-in. diameter. The throat is 5 ft in diameter, completely metal lined for accuracy, and containing a battery of piezometer connections on each side. The registration obtained from the float wells is transmitted electrically.

Design provisions for pre-aeration include four parallel channels 167 ft long, 21 ft wide, and normally $14^1/_2$ ft deep. These channels branch off at right angles from the east side of the influent conduit. A cross channel at the discharge end is also equipped for aeration so that the sewage continues to be well agitated right up to the time it enters an influent conduit distributing to the sedimentation tanks. Control of the flow to and from the aeration channels is by means of a multiplicity of small, light-weight, low-head gates which are of the so-called irrigation type, and which are easy to handle. These gates are of sufficient capacity to discharge the maximum of 300 mgd distributed in all four channels.

To obtain flexibility in operation, there are two sluice gates halfway through the cross channel at the approach end, which, when closed, divert the entire discharge through the first two of the four channels. The gates at the ends of these two channels are in two lifts instead of one, to double their capacity as required when the flow is thus confined to two channels. Furthermore, at the entrance end of these two channels there are only three instead of four sets of gates, giving only three-quarters of the gate area, so that with all four channels in use the additional loss of head through the reduced number of gates on the first two channels just offsets the loss of head through the sluice-gate openings in the approach cross channel leading to the latter two.

Aeration channels are of standard design, providing aeration through pipes with headers and diffusers which can be removed bodily without the necessity for unwatering. Provision is made at two points along each of the four aeration channels so that baffle logs can be inserted at any elevation if and as required to break up any tendency to longitudinal short-circuiting. The detention period is 20 minutes at the design rate of 112 mgd, and a little over a half hour at 70 mgd. The air capacity provided will give 0.1 cu ft of air per gallon of sewage treated for a flow of 144 mgd.

Missouri River Basin Development

Coordinated Plan as Approved by Congress

By DELBERT B. FREEMAN, M. ASCE
LIEUTENANT COLONEL, CORPS OF ENGINEERS, U.S. ARMY; DISTRICT ENGINEER, OMAHA, NEBR.

FROM its headwaters at Three Forks in Montana to its union with the Mississippi near St. Louis, the Missouri River is the longest single river in the United States. In many other respects it is unique. It is subject to great variations in discharge—from 4,000 to 900,000 cu ft per sec at its mouth. The area drained is about one-sixth of the entire United States and includes a great variety of climatic and topographic conditions. In the upper reaches of the basin there is not enough water for crops without irrigation, while in the lower river valley there is often entirely too much water, as residents of areas subject to flooding well know.

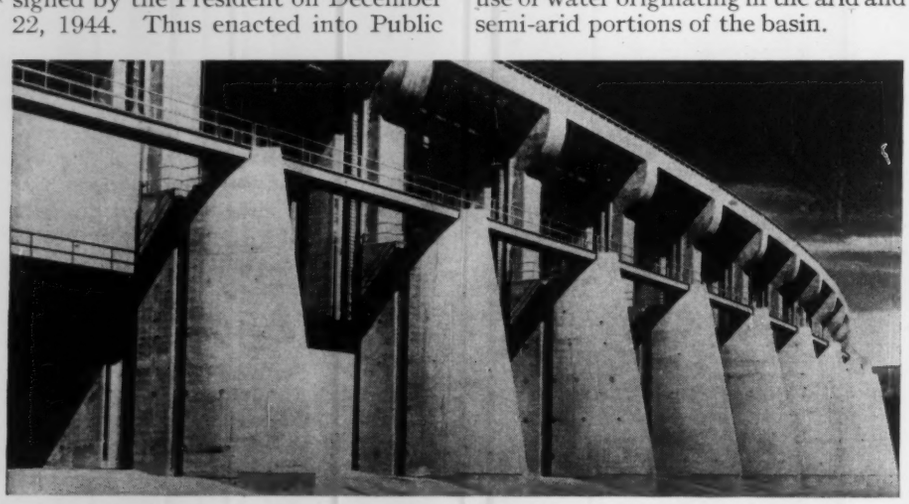
PROBLEM OF CONTROL

To put it simply, the problem of control in the Missouri River Valley includes every condition from drought to flood. The floods can be controlled and the droughts alleviated when and if the comprehensive plan approved by Congress is accomplished. Such accomplishment will require the joint efforts of several federal agencies and many state and local agencies, and at best—assuming adequate funds for expeditious construction—will not be completed much short of a decade hence.

Approval of the comprehensive plan became official when the Omnibus Flood Control Bill for 1944 was signed by the President on December 22, 1944. Thus enacted into Public Law 534, were basic elements of the Corps of Engineers' "Pick Plan" and the Bureau of Reclamation's "Sloan Plan." The Pick Plan was primarily a flood control plan, but provided many corollary benefits for other purposes. On the other hand, the Sloan Plan was primarily an irrigation plan, although it likewise provided other related benefits.

POLICY ESTABLISHED

Before the two plans were coordinated and approved by Congress, there was much discussion of them by the public. This inevitably led to some honest questions and differences of opinion. These discussions and questions served to bring out for critical scrutiny and analysis every feature of the two plans in question. During these discussions, there was actually only one fundamental point of conflict, and that was a conflict of interests (not of agencies) regarding the priority of use of the water to be regulated by the proposed reservoirs. This was a matter that could not be settled by the two agencies because it involved a question of Congressional policy which at that time had not been established. Actually, the coordination of the engineering features of the two plans was an easy matter and was done in less than two days' time in October 1944, after Congress indicated the policy it intended to follow as to priority of use of water originating in the arid and semi-arid portions of the basin.



WORLD'S LARGEST EARTH-FILL IS FORT PECK ON THE MISSOURI RIVER, SERVING NAVIGATION AND POWER
Spillway, Here Shown, Has Sixteen Fixed-Roller Vertical-Lift Gates

The report showing the results of this conference in Omaha was submitted jointly to the Chief of Engineers and to the Commissioner of Reclamation, who in turn submitted it with their approval to the Secretary of War and to the Secretary of the Interior. The Omnibus Flood Control Bill of 1944 then approved the two plans as coordinated by this report (Senate Document 247). The bill was enacted into Public Law 534 and approved by the President on December 22, 1944. That was the first step—approval of the plan for Congress. Congress next authorized appropriations to initiate the plan.

HIGHLIGHTS OF PLAN

The overall plan provides for the construction of a total of 105 reservoirs scattered throughout the basin, five of which are on the main stem of the Missouri River above Sioux City, with an aggregate gross storage capacity of approximately 80 million acre-ft, and a series of levees along each side of the main stem of the river between Sioux City and the mouth (near St. Louis). The estimated cost for the ultimate accomplishment of all these structures is approximately one billion five hundred million dollars. This is the biggest single program of basin improvement ever to be approved under any flood control act. We are truly on the threshold of a new era of development in this great Middle-western area. It would be well to examine the law to see what specific provisions have actually been made to execute and administer the plan.

First, with regard to policy matters, the law states that it is the policy of Congress to recognize the interests and rights of the states in determining the development of the watersheds within their borders, and likewise their interests and rights in water utilization and control. This establishes a policy of coordination between the federal government and the states in the planning and execution of these projects.

Second, with regard to policy again, the law states:

"The use for navigation, in connection with the operation and maintenance of such works herein authorized for construction, of waters arising

in States lying wholly or partly west of the ninety-eighth meridian shall be only such use as does not conflict with any beneficial consumptive use, present or future, in States lying wholly or partly west of the ninety-eighth meridian, of such waters for domestic, municipal, stock water, irrigation, mining, or industrial purposes."

This means that the area lying roughly west of a line passing through Sioux City, Iowa (the existing head of navigation of the authorized 9-ft channel), is deemed to have priority of use for water for irrigation, domestic stock, mining, and industrial purposes.

RESPONSIBILITY DELEGATED

Now what does the law provide with respect to the division of responsibility in the execution and administration of the projects in the plan?

First, with respect to the Secretary of War, he is charged with the responsibility for determining reservoir storage capacities and for prescribing rules and regulations for the use of storage allocated for flood control or navigation. The law also specifically authorizes the Secretary, in reservoir areas under the control of the War Department, to construct, operate, and maintain public park and recreational facilities. This authority regarding public park and recreational facilities he did not previously have.

Second, with respect to the Secretary of the Interior, he is charged with the responsibility for determining the reservoir capacities for irrigation in the reservoirs utilized for that purpose. Furthermore, the law states that the Secretary of the Interior shall transmit and dispose of such power and energy as is not required in the actual operation of all projects under the jurisdiction of the War Department in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles.

Third, with respect to the Secretary of Agriculture, the law provides that Federal investigations of watersheds and measures for runoff and waterflow retardation and soil-erosion prevention on watersheds shall be under the jurisdiction of, and shall be prosecuted by, the Department of Agriculture, under the direction of the Secretary of Agriculture.

Fourth, with respect to the Federal Power Commission, the law specifies that the rate schedules set up by the Secretary of the Interior on War Department projects shall be subject to the confirmation and approval of the Federal Power Commission.

The preceding discussion is a brief summary of some of the specific provisions of the law relating to the responsibilities of the various major federal agencies concerned with the development of the plan. However, it cannot be assumed that there are no problems of coordination. Even with specific definition of responsibility, there is always need for a certain amount of coordination. This applies within a single organization as well as between organizations. With this need in mind, a coordinating group has been set up. This group is called the Missouri Basin Inter-Agency Committee and was created for the purpose of effecting the complete coordination of planning, construction, and administration for the Missouri River basin's multiple-purpose development program as authorized by Public Law No. 534. (See article by R. C. Crawford in CIVIL ENGINEERING for February 1946, p. 64, for the organization of this committee.)

So far the Committee's activities have been largely confined to the coordination of planning activities. However, some construction funds have been appropriated by Congress and construction work has already commenced on some of the projects in the plan. This point should be borne in mind: no benefits will actually accrue from the plan until the projects are constructed and put in operation.

SPECIFIC BENEFITS EXPECTED

What are some of the specific benefits of the plan? They are many and widespread. To summarize briefly, some of them are:

Flood Control. One million five hundred thousand acres of fertile farm land along the main stem of the Missouri River between Sioux City and the mouth will be protected. In addition, protection will be given to the cities of Sioux City and Council Bluffs, Iowa; Omaha, Nebr.; Kansas City, Kans.; Kansas City, Mo.; and about 50 other municipalities along the main stem. There will also be local flood protection downstream from each of the reservoirs in the basin. This will result in increased security for agriculture, industry, and commerce.

Irrigation. Irrigated lands that now are short of water will be given an added supply; also storage will be available to irrigate another $4\frac{1}{2}$ million acres. This will enhance agriculture, particularly in the northern and western parts of the basin.

Navigation. By holding back the destructive waters during flood seasons, when the water is neither needed nor wanted downstream, and permitting its release at a uniform rate later during the low-water season, navigation on both the Missouri and the Mississippi rivers will be enhanced and stabilized.

Power. The large amount of head that will be created at the dams by the conservation and storage of water in the reservoirs, together with the releases of stored water through the dams in connection with operation for flood control and irrigation, navigation and sanitation, will be available for the development of large quantities of hydroelectric power. It is estimated that the power potentialities of the system of reservoirs, operated for the primary purposes for which they will be constructed, would permit the ultimate generation of approximately 10 billion kwhr per year. This incidentally is roughly equivalent to the peak annual output of the Tennessee Valley Authority system during the War. This abundance of power, which can be generated as a by-product of the primary functions of the reservoirs, should be an effective stimulant to the economic development of the basin.

Domestic Water Supply and Sanitation. Storage in the numerous reservoirs will supply urgently needed water for drinking purposes and sanitation. Many communities in the basin are now suffering from a lack of drinking water. A more dependable water supply will be assured along the main stem to cities on the Missouri and the Mississippi.

Recreation and Wildlife. Facilities will be provided at reservoirs for public fishing, hunting, boating, and parks. Fish and game preserves will be set up.

Finally, but not of least importance, the accomplishment of this plan will, by stabilizing and expanding agriculture, encouraging civic enterprise, and creating new commerce and industry, mean a new and expanding era of economic development for the entire Missouri River basin and contiguous areas.

It is not necessary to remind engineers of the complex engineering problems that still lie ahead before all these benefits can be realized. They are varied and many. However, with the continued and able assistance of private engineering firms and consultants, federal agencies stand ready to construct these projects as fast as the necessary funds are made available by Congress.

What Can Be Done About Traffic Congestion?

Traffic Engineering and Enforcement Methods

By ROBERT A. MITCHELL
CHIEF, BUREAU OF TRAFFIC ENGINEERING, CITY OF PHILADELPHIA, PA.

TRAFFIC congestion is a serious problem in practically every city in the country. City officials, lulled to sleep by the reported great decrease in motor vehicles due to breakdowns and age during wartime, failed to prepare for the sudden increase in traffic after V-J Day. Street systems in most cities are not "keyed" to the traffic demand because of lack of proper traffic regulations, half-hearted enforcement of what regulations are in effect, and improper use of traffic control equipment.

Some communities are planning new facilities such as highways and off-street parking areas to relieve the burden on the present street system. The majority, however, are trying to "muddle" through with what they have at hand. Methods that have been developed by city traffic engineers to relieve congestion on the present street system of some cities can be followed by other communities to advantage.

CONGESTION of street traffic is a major problem confronting cities. As a matter of fact, a recent poll conducted by the City Planning Division of ASCE revealed that it is the No. 1 problem that must be solved to prevent urban decentralization. Seeking measures to alleviate the situation, this Division arranged a joint session with the Highway Division at the Society's Annual Meeting in New York. The resulting symposium gives experts' analyses of the component parts of the problem. The first installment appeared in the April issue. The second followed in May; and these two articles complete the series.

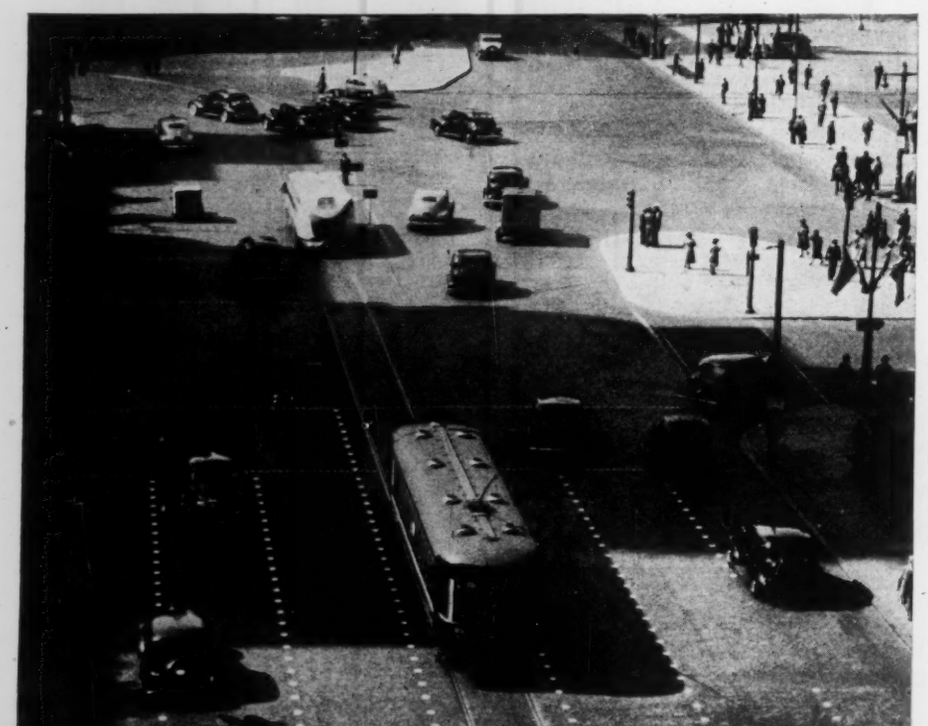
The use of one-way streets, for instance, has been effective for several reasons. A street on which all the vehicular traffic moves in one direction has more capacity than the same street when vehicles move in opposing directions. The movement in one direction is easier for the driver, reduces the conflict caused by left turns and permits the operation of a traffic-signal system with almost perfect coordination at any predetermined speed. Washington, Detroit, and Philadelphia are only some of the cities where one-way streets have been effective in relieving traffic congestion.

Where traffic signals are in operation, much improvement can be effected by reducing the cycle length and proportioning the signal phases more in line with the splits in traffic volume. Cycles 40 to 50 seconds long are used successfully in a number of cities, but many authorities are still skeptical of such short cycles. Better coordination of existing signals through interconnection, and the supervisory help of a master controller, will naturally speed up traffic.

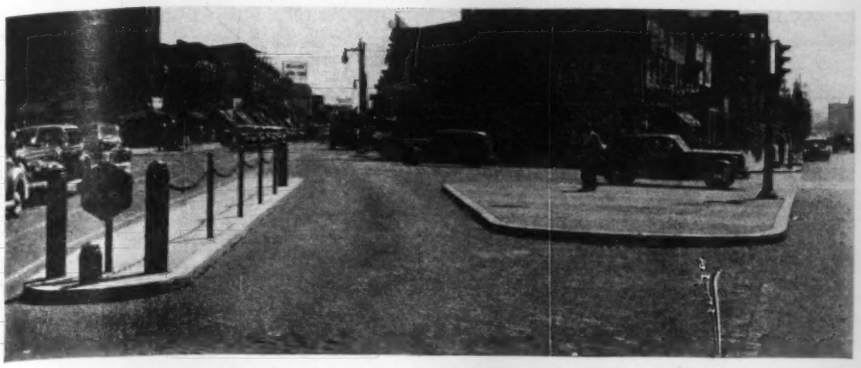
Proper installation, operation, and maintenance of coordinated traffic-signal systems in congested areas to supplant police-officer control at independent corners has done much to improve traffic conditions and also provide more economical control. Prerequisite for such a signal system may be found in the *Manual on Uniform Traffic Control Devices for Streets and Highways* published by the Joint Committee on Uniform Traffic Control Devices. The actual timing of such a system should be left to a traffic engineer or one experienced in such matters.

Properly designed and located traffic islands can relieve congestion in several ways. Such islands in wide streets are places where pedestrians can stop in safety, thus reducing the pedestrian clearance period required and providing more time for vehicular movement. At street-car loading points, they help eliminate the delays occasioned when motorists must stop while pedestrians are boarding or leaving street cars. Where the roadway area is large, particularly at intersections, they can be used to channelize vehicular traffic, thus decreasing delays due to conflicts and the indecision of drivers.

The measures just mentioned, together with such things as the marking of traffic lanes, elimination of turning movements, the establishment of truck routes, proper signing of routes, use of standard traffic-control equipment, and adjustment of transit facilities, can be helpful in



TRAFFIC ENGINEERING HAS REMOVED PARKED CARS FROM FILBERT STREET, PHILADELPHIA, AND PROVIDED MARKINGS AND ISLANDS



ISLANDS CHANNELIZE TRAFFIC AT A DIFFICULT INTERSECTION

relieving congestion. However, without building new facilities, a major improvement can only be obtained by making more street space available. This can be done by the elimination or better regulation of curb parking, and by prohibiting loading and unloading during the peak hours of traffic demand.

Rare is the merchant who doesn't believe that traffic congestion in front of his store means better business. This belief has been responsible, probably more than any other one thing, for the clogging of streets with parked cars in the business districts

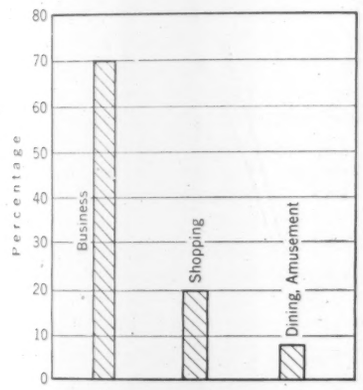


FIG. 1. REASONS FOR PARKING IN CENTRAL DISTRICT
From Philadelphia Survey of 1945

of all but a few cities in the country. The influence exerted by merchants and their associations on public officials continues to prevent traffic authorities from doing a major job of reducing congestion.

This belief of merchants might be proper if the majority of their customers used automobiles and then could find parking space at the curb within a reasonable distance of their destination, but the facts indicate that such is not the case. In larger cities, it is well known that the great majority of visitors to the business district use mass transportation facilities. Even in smaller communities, where private automobiles predominate, there is only enough curb space to take care of a small percentage of the vehicles in use even if it were all available.

PHILADELPHIA SURVEY

Such facts were found in a recent curb parking and shopping survey in a 64-block area of Philadelphia's central business district. The findings are applicable to many cities and are as follows:

1. Between 8:00 a.m. and 6:00 p.m. there were under 14,000 vehicles parked both legally and illegally at the curb. These cars carried less than 24,000 persons, or a little over 3% of the more than 726,000 persons who come into the central business district during a typical weekday.
2. An analysis of the reasons for which the occupants of these parked cars came to the district is given in Fig. 1.
3. Of the group who gave business as the reason for parking in the district, over 12% were the store owners themselves. The complete breakdown is shown in Fig. 2.
4. Over 78% of the cars were parked for less than one hour, yet the 3% that were parked over five hours took up 18% of the curb space available.
5. The results of interviews with shoppers in the stores in the area indicated the means of transportation they used in reaching the business area. See Fig. 3 for results.

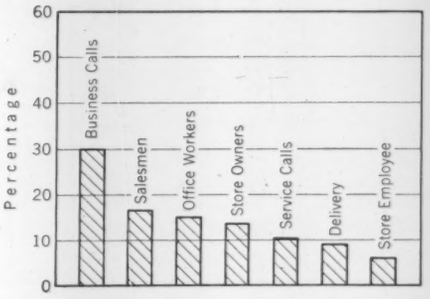


FIG 2. ACTIVITIES OF BUSINESS PARKERS
A Breakdown of 70% of All Parkers in Philadelphia Survey

6. Of the shoppers using private automobiles, 26% parked their cars in the street. Thus, less than 3% of the total number of shoppers parked their cars at the curb.

These facts bear out what traffic engineers have believed to be true for many years—that the great mass of the business and buying is done by persons using mass transportation, and therefore that merchants and business interests should support measures to free the streets, where necessary, for the better movement of vehicles and oppose the use of street space for the storage of vehicles.

As a result of these surveys, parking was prohibited on practically all the streets in the central business district of Philadelphia beginning January 2, 1946, with the whole-hearted backing of the important merchant associations.

In spite of the fact that only a small percentage do use private automobiles for business and shopping, this group is important and must be considered. There appears to be only one sensible way and that is to provide convenient, well-operated, and reasonably priced off-street parking facilities. Philadelphia has received $20,000 to survey the off-street parking problem and make recommendations for its solution.

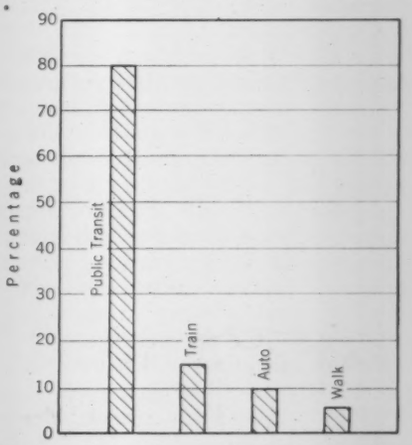


FIG. 3. TRANSPORTATION MEDIUMS USED BY SHOPPERS
Data Secured From Interviews with 5,000 Shoppers in Downtown Philadelphia

Human nature being what it is, proper enforcement is needed to make traffic regulations effective. Parking regulations in small communities are usually enforced by police officers on foot, while in larger cities the area can be covered best by police on motorcycles. Limited parking regulations are more difficult to enforce than no parking bans, but parking meters seem to have simplified the procedure. They eliminate the de-

lay in manually checking the time each car is parked, and for some peculiar reason they influence motorists to voluntarily obey the time limit.

The use of serially numbered, triple-ticket violation notices has proved very effective in enforcing traffic regulations. One copy of the notice is placed on the car or given to the violator so he knows at the time just what regulation he has violated. Another copy is sent to the traffic court, and the third is kept by the police. When the fine is paid, all three copies are returned to the issuing official, thus making it more difficult for the violation to be squashed by political fixing.

In the main, police know how, and desire, to properly enforce traffic regulations. They can be relied upon to do this if they are backed up by the higher-ups and the courts.

City Planning, Zoning, and Housing

By H. EVERT KINCAID

EXECUTIVE DIRECTOR, CHICAGO PLAN COMMISSION, CHICAGO, ILL.

EVERY progressive city across the country is now busily engaged in the formulation of comprehensive city plans and in the preparation of working drawings and specifications for a wide range of public improvements held in abeyance during the war years. Almost without exception these improvement programs have as their principal objective the gradual elimination of congestion from crowded city areas so that they will be safer and more desirable places in which to live—congestion caused by over-intensive use of the land and by poor planning in the location of public facilities. Accompanying the matter of congestion are all the problems of convenient and efficient transportation; safety to life and property; adequate, sanitary, and decent housing; stabilization of property values; and many other matters relating to the social well-being of the people.

Never before in the history of city growth has so much attention been focused on these municipal problems. In the halls of Congress and in the state assemblies more and more legislation, designed to improve upon urban living, is being framed. Also, added grants-in-aid are being made available to cities, which heretofore have received inequitable consideration by rurally dominated law-making bodies. Federal funds have recently been appropriated and designated specifically for highway development within urban centers, even including provision for the acquisition of rights of way so that interregional highway traffic can reach major destinations—which are the centers of cities—expeditiously and with safety.

The power of eminent domain, previously delegated to cities for the acquisition of lands for public purposes only, has now been made available in several states, including Illinois, for the purchase and assembly of properties in blighted areas. Liberal legislation has also been enacted with regard to tax adjustments in depressed urban areas to provide added incentives toward redevelopment. City after city has authorized bond issues for public improvements—a type of municipal financing which has not been available in recent years. Many other reforms and progressive fiscal policies are being adopted by government to correct those deficiencies and to overcome those liabilities which confront our cities.

What has prompted this constructive activity and interest in urban problems? Can it be that city officials and community leaders have become alarmed over depreciating tax assessments on real estate? Is it

FIG. 1. SUBDIVISION OF CHICAGO INTO COMMUNITIES, SUBCOMMUNITIES AND NEIGHBORHOODS AS A PART OF A COMPREHENSIVE CITY PLAN

because of the exodus of purchasing power and civic leadership from the central city engendered by the migration of thousands of desirable families from the city to nearby "dormitory communities" for the purpose of finding a better environment? Is it the smoke and dirt, the congestion of traffic, the lack of convenient transportation, inadequate public services, substandard housing in slum areas, and the unsightliness of many sections that have made living within the city intolerable? Or is it because we are now compelled to plan intelligently and aggressively and with vision and integrity for a more wholesome, economic, and social life in cities? It is, of course, a combination of such diverse factors as these that has fired the political imagination of our administrative and legislative leaders and stirred them to effective action.

It is a fairly well documented fact that industry and commerce are sensitive to major population shifts. Thus, if the processes of disintegration and decentralization are allowed to continue unabated, not many years will pass before our great cities will be severely weakened in employment opportunities and in sources of revenue.

Because of the disorderly pattern and mixed land uses which characterize our densely built-up urban centers, a certain amount of redistribution of population and realinement of commerce and industry would be healthful and beneficial to all. The single factor of overcrowding has contributed more than anything else to the breakdown of our cities as good places in which to live and raise families. Fundamentally, however, aggregation of population is not only traditional but is still, in my judgment, an economically and socially sound concept—provided the communities are both spacious and orderly. This is in spite of the remonstrances of those scientists who paint alarming pictures of the devastation that might be inflicted on great centers of industry and population during future atomic wars.

If the survival of our civilization requires the dismemberment of our cities and the transplanting of their fragments into remotely hidden crannies of the earth, as is being advocated, I seriously question the validity of such a civilization. I, for one, do not subscribe to such defeatist philosophies. Instead, we should have faith in our "peace planners" and proceed with the preparation of realistic and practical city plans and programs of action geared to cope with urban problems and to guide future new growth and redevelopment effectively.

CHICAGO PLAN

In Chicago there is being prepared just such a comprehensive plan and action program. It proposes the gradual elimination of all the blighting influences which have exerted their cancerous effects on most of the areas surrounding the central business district, and the guidance of all new residential growth into a cellular pattern of communities and neighborhoods. All this planning is based on carefully prepared surveys of existing land uses, and searching analyses of the economic and social background of the city. On this foundation is being constructed a land-use plan which in accordance with long-range objectives, designates the highest and best use of all usable space within the city. Quite obviously, existing structures and conditions have had a decided influence on this pattern of future land use. Most of the established public and private facilities are being profitably fitted into the plans for the development and redevelopment of a better Chicago.

In other words, the city plan for Chicago now evolving from the coordinated efforts of all departments of local government, working in cooperation with the Plan Commission, starts from an arrangement of substantial existing improvements on which are superimposed recommendations for new development that will assure an urban fabric pleasing in design, desirable in use, economical, and of great tensile strength. This plan for better urban living includes all the facilities that have been discussed in this symposium. First a system of expressways (67 miles in the first stage) has been designed to radiate from the central business district into and through all the major populated sections of Chicago, as well as to serve its great industrial districts and to make connection with the interregional highway system of the county, state, and federal governments. All the public agencies have officially approved this great system of expressways and have agreed upon a proration of the costs. The acquisition of rights of way is well along on the initial route, and the engineers of the collaborating agencies are now at work on surveys and project plans for the rest of the first-stage system.

Supplementing this system of expressway routes is a carefully studied arrangement of major thoroughfares designed to feed traffic into the expressways and provide interconnecting arterial routes between communities. Integrated with the thoroughfare plan is a proposed system of expanded and improved local transit facilities which will soon be publicly owned and operated by the recently constituted Chicago Transit Authority. Within the action program of this public agency are included extensive subway projects, elimination of the elevated loop in the central business district, and far-reaching improvements in surface mass-transportation facilities. Off-street parking terminals in the central business district and at major shopping centers are important adjuncts of the thoroughfare and transit plans. Bus and truck terminals are also under the microscope so that they too will fit harmoniously into the overall plan and yet be so located as to assure efficient operation.

This network of thoroughfare and local transportation routes, together with established industrial and commercial districts, forms the framework of the city plan within which has been designed an organic structure of communities and neighborhoods. These residential areas are planned to accommodate by 1965 an estimated population of 3,800,000—or about 1,100,000 families. Chicago's future citizens, according to the Plan Commission's recommendations, will live in residential districts varying in population density from 8,000 to 50,000 persons per gross square mile. This would economically absorb all the land suitable for residential use within corporate Chicago. Thus our city of tomorrow is being planned as a metropolis of attractive, modern communities—actually small towns which will combine the economic, social, and cultural advantages of large cities with the neighborliness and most of the other desirable features of quiet, small-town life.

PATTERN OF COMMUNITIES

The communities in this future Chicago will range in population from 45,000 to 90,000, and average approximately 65,000 people. They will be separated from one another by the projected expressways, by the fixed pattern of railroad and industrial facilities, by waterways, and where feasible by open areas—often referred to as buffer parks—which can also be used for various recreational purposes. It is contended that each community should be the service area for a high school and an adjoining community park and playfield. To this end the Commission recognizes the close cooperation it has received from

MODEL RESIDENTIAL NEIGHBORHOOD PROPOSED FOR CHICAGO

the Board of Education, whose officials have evidenced a willingness to have the future school-district pattern conform to the planned community areas.

The 59 communities, which make up the planned corporate Chicago, are further divided into 128 subcommunities. The device of subcommunities is utilized for the purpose of distributing park and play space to satisfy more adequately the recreation desires of all age groups. Such facilities are conveniently located within reasonable walking range of the homes of all families within the service area. In this phase of the planning program the Commission commends highly the assistance and aid it has received from the officials of the Chicago Park District. They have also evidenced their approval of the Commission's plan of community divisions by proposing the acquisition of additional park and playfield space at a cost of 24 million dollars within the next four years—all in accordance with the city plan.

Each of the planned communities embraces from four to twelve neighborhoods and these, in total, aggregate 559 throughout the city. The neighborhoods are typically a quarter of a square mile in area in the more intensely occupied sections of the city and somewhat larger in the less populous areas. In population they range between 4,000 and 12,000. They too are separated by expressways, major streets, industrial areas, or other physical boundaries over or through which it is not deemed desirable or safe for people—especially young children—to cross frequently in order to reach such objectives as schools, playgrounds, and local shopping centers.

The typical neighborhood is the service area of an elementary school located near its center. It is virtually a self-contained unit having within its borders stores and other facilities necessary for everyday activities, with the exception of employment. The neighborhoods, 8 to 10 of which constitute a typical community, are small enough to cause the residents to have a feeling of pride and to encourage them to take a more active part in local and civic affairs.

DESIGN STANDARDS DEVELOPED

The Commission has developed standards of design for application in the development of new residential construction—much of which is anticipated on now vacant land—and for guidance in the rebuilding of blighted areas. These standards of design will assure better land utility, more attractiveness in the appearance of newly created neighborhoods, and greater protection to the people who will occupy them. Over and over the Commission has reiterated the need for street patterns that discourage fast-moving traffic through neighborhoods. It has been made abundantly clear that the real purpose of the extensive network of expressways is to remove fast through traffic from the local street system and to relieve existing congestion. Consequently residential areas will become quieter and safer places in which to live.

The city plan emphasizes the need for rebuilding the old sections of Chicago where properties have become obsolete and unfit for further use. Within these areas, most of which are strategically located in relation to the central business district, are opportunities for developing new residential neighborhoods of considerable attractiveness and livability. The plan likewise proposes well-designed neighborhoods in the peripheral sections of the city that are now undeveloped or sparsely settled. An arrangement of streets and service facilities is planned in both the new and redevelopment neighborhoods that will discourage through traffic and avoid the problems of congestion that usually characterize residential districts.

Provision is being made for increased vehicular-traffic capacity on all major streets which border the residential neighborhoods so that over a period of time through movements will flow conveniently and safely over a system of thoroughfares. Thus all extraneous traffic will be drained away from local residential streets, providing a greater measure of protection to the residents.

Augmenting these physical phases of the city plan, and to assure its effectuation, is a whole series of legal instrumentalities. They include zoning, platting regulations, building codes, and the protection of mapped streets. In each instance our City Council is giving careful study to the adequacy of present state statutes and local ordinances with the idea of creating all the necessary enactments to properly implement the city plan.

In addition to the physical and legal phases of city planning, an intelligent and intriguing program of public relations must be prepared. People are eager to understand the problems of their community and will readily lend their support to well-conceived plans provided they are made understandable. City plans, like blueprints and cost analyses, must be accompanied by frequent and concise newspaper publicity, magazine articles, illustrations, animated models, motion pictures, and all other available "selling" media. The need for planning must reach the children, the parents, the business men, the clergymen, the teachers, the ward politicians, and the legislators. Only in this way will you and I see realized our plans for relieving traffic congestion and for building better cities.

Engineers' Notebook

Suggestions and Practical Data Useful in the Solution of a Variety of Engineering Problems

New Hydrant Assembly Conserves Space

By SAMUEL C. MCKEE, M. ASCE

LUCAS COUNTY SANITARY ENGINEER, TOLEDO, OHIO

ONE of the problems confronting engineers engaged in public work has been the lack of adequate space for underground structures such as storm and sanitary sewers and water and gas lines. This is especially true in metropolitan areas where in the past a lot of subdivisions have been made of acreage property, and where a lack of adequate zoning and city and county planning has permitted a considerable number of narrow streets, roads, and other public thoroughfares to come into the picture.

With the thought of conserving such space as is available, the Lucas County Sanitary Engineering Department, of Toledo, Ohio, has adopted a new hydrant assembly which places the hydrant directly over the water main. This eliminates the conventional offset which usually requires from 3 to 4 ft of space and which in many cases has to be switched around at a later date to provide for other underground utilities, some of which may have to be located at the same elevations.

This new assembly consists of a special Y-casting which is placed in the line with the Y-branch in a vertical position, to which in turn the valve and hydrant are connected, thus placing the hydrant and valve directly over the main, as shown in the accompanying photograph. The space intervening between the main and the valve and hydrant is then filled with a lean-mix concrete to absorb any shock that may result from a vehicle collision, or other impact that may occur. The lean-mix concrete can easily be removed if the hydrant has to be relocated.

This installation is simple to assemble, and our experience has been that it speeds up construction operations, especially where a trenching machine is used, as it eliminates the hand excavation necessary where the conventional T-assembly is used and the hydrant is offset from the main.

Y-ASSEMBLY OF HYDRANT AND WATER MAIN USED IN LUCAS COUNTY, OHIO

The contractors usually assemble the hydrant and valve on the surface and then place them in position over the line immediately after placing of the Y-branch and the next pipe section. This assembly is being used exclusively in connection with our present program, involving approximately 25 miles of 6-in. and 8-in. extensions.

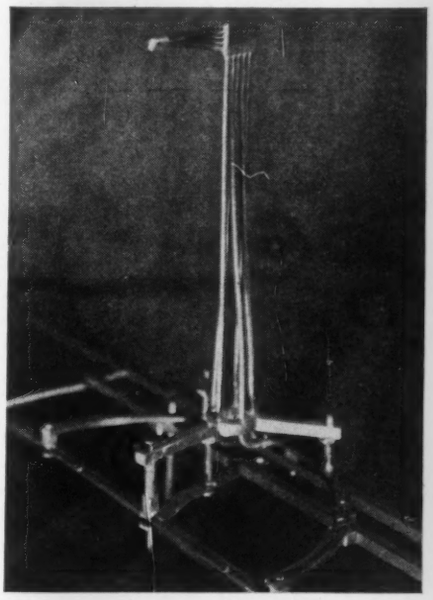
A Direction-Indicating Velocity Tube

By WALLIS S. HAMILTON, ASSOC. M. ASCE

ASSISTANT PROFESSOR OF CIVIL ENGINEERING, THE TECHNOLOGICAL INSTITUTE, NORTHWESTERN UNIVERSITY, EVANSTON, ILL.

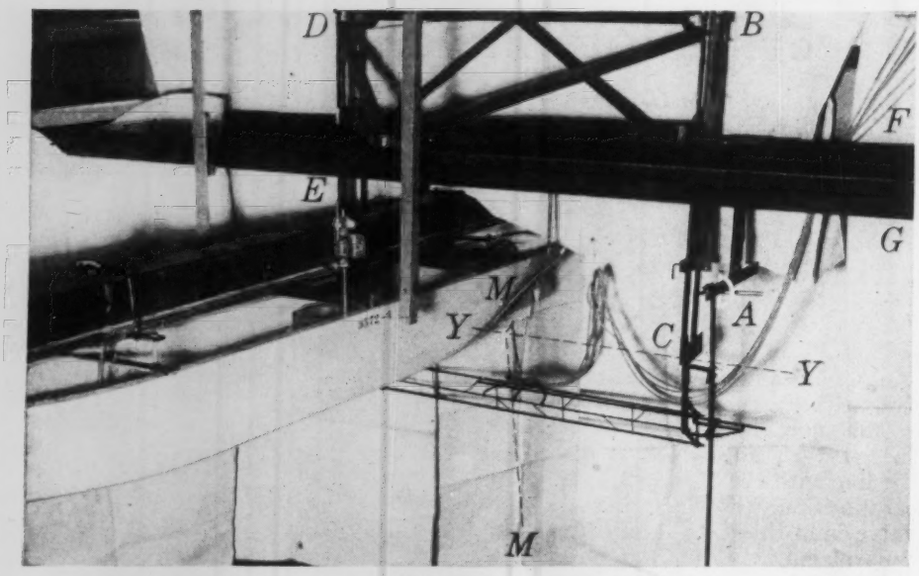
WHEN fluid motion is studied experimentally, measuring the direction of velocities is sometimes as important as determining their magnitude. For example, the purpose of a hydraulic model study may be to eliminate cross currents at a lock entrance, or spiral flow in an artificial channel. In order to compare the merits of different designs, the investigator must find both the magnitude and the direction of the velocity vectors at various places in the flow pattern.

If the model and fluid are transparent, a quite accurate picture of the directions of flow can be obtained by injecting smoke or dye into the fluid stream. Sometimes, however, the streaks cannot be seen from the proper angles to permit measuring their direction in space, or if field investigations are undertaken, the water may be too muddy to allow the use of dye or streamers. Under such circumstances some kind of mechanical or hydraulic direction-finding device must be used.



DIRECTION-INDICATING VELOCITY TUBE

One such device employs a Pitot-style tube which is sensitive to small departures of the tube axis from the direction of flow. When such a tube is properly mounted, it can be used to measure both the magnitude and the direction of fluid velocities. Its construction differs from the ordinary Pitot-static tube in that each of the four side openings can be connected to a separate manometer. Since the tip is a short, round-nosed cylinder, pressures at these openings will be alike when the instrument is pointing directly into the current, but if it is turned slightly askew, the openings facing somewhat upstream will receive more pressure than the others.



MOUNTING OF VELOCITY TUBE TO DETERMINE FLOW ABOUT A SHIP MODEL

Thus, when the tube is in use, the operator adjusts its direction until the manometers indicate identical pressures at the side openings. The axis of the tip then coincides with the direction of flow, and the difference in head between the stagnation opening and the side openings is a measure of the magnitude of the velocity.

OPENINGS IN LOW-PRESSURE REGION

The tip of the instrument is a brass cylinder a little over $^1/_4$ in. in diameter, into which are soldered the ends of five stainless-steel hypodermic needles. Each needle connects one of the openings in the tip with a five-passage elbow supported in turn by five lengths of brass tubing. Small hoses lead from the lower ends of these tubes to a manometer panel when the equipment is in use. The side openings in the tip are purposely located in the under-pressure region near the nose to provide a maximum manometer differential between the stagnation opening and the side openings and to increase the sensitivity of the tube to oblique currents.

Because the side openings receive less than hydrostatic pressure, the velocity coefficient for the tube is not unity. Moreover, the particular investigation for which this apparatus was designed required that velocities be measured near solid boundaries and barely below the water surface—locations where the coefficient is altered by the limited extent of the fluid. For these reasons, and also to find how sensitive the pressure openings are to oblique currents, the characteristics of the tube were determined experimentally. Details of the method of calibrating the instrument are not pertinent, but the general system was to compare reliable static-pressure and stagnation-pressure readings taken in a small flume with pressures indicated by the velocity tube. For example, in investigating boundary effect, the total head at a point near the floor of the flume was measured with a small Pitot tube; the tube was then removed and the static head read by a piezometer opening in the floor. Next the velocity tube was placed in the same spot the Pitot tube had occupied, and readings at all five openings were taken. The pressure at each side opening was compared with the static head that had existed in the undisturbed flow, and the stagnation pressure was compared with the Pitot-tube reading.

The coefficient of velocity was found to be 0.85 at velocities of 2 to 3 ft per sec, except when the tube was brought within two diameters of a boundary or the water surface. Under such circumstances, the coefficient increased because of the attendant rise in pressure at the side opening nearest the boundary or the change in flow pattern caused by a free surface. The velocity coefficient of any tube having side openings close to the nose, moreover, is likely to depend on the Reynolds number of the flow, and hence such an instrument should be calibrated through the range in which it is to be used.

THE SUPPORTING STRUCTURE

If a fluid stream is to be traversed by any sort of velocity-measuring or pressure-measuring instrument, the device must be supported by a member or framework in a fashion such that the vertical, lateral, and longitudinal coordinates of the instrument can be both changed and measured. Equipment suitable for this purpose may be quite simple as are, for example, the graduated rod and tape used by a hydrographer making current-meter measurements. When, however, the direction in which the instrument points must be capable of close adjustment and measurement, the supporting structure becomes more complicated, and the success of the experiment may depend chiefly on how easily and accurately the position and direction of the instrument can be regulated.

A well-designed structure will neither vibrate in the fluid stream nor disturb the natural flow pattern a significant amount at the point where the measurement is taken. Hence at least the members near the instrument must be small in cross section, and long bars or rods must be braced to prevent flutter. Designs of course will vary greatly in different applications, but as an example of a satisfactory one an apparatus used in determining the flow pattern around a ship model (shown in a photograph) will be described briefly.

Contrary to the usual method of towing ship models, this hull was anchored in the throat of a water channel, and thus the measurements were analogous to those that might be made about a bridge pier, an airship in a wind tunnel, or any other stationary object in a moving fluid. The tip of the tube is at the intersection of the axes *MM* and *YY*. In this case a light transverse frame located beneath the hull and fixed at both ends to vertical bars was found rigid enough to hold the instrument steady at the comparatively low velocities (up to 3.25 ft per sec) that prevailed.

The apparatus is operated as follows: Handle *A* is used to rotate the instrument about the axis *MM*, and the angle of rotation is measured from the T-shaped member on which the white protractor hangs. The vertical angle is changed by rotating the lower part of the frame together with the tube about the axis *YY*. Handles for controlling this motion and the protractors for measuring the vertical angle are outside the photograph just above the points *B* and *D*. Since both axes pass through the tip of the instrument, a change in alinement does not cause a shift in the point where the velocity is being measured.

Vertical bars *BC* and *DE* are supported in guides by cables running over pulleys at *B* and *D*, and can be raised or lowered simultaneously to change the elevation of the lower part

of the structure. Further, the entire frame slides along the transverse rails *F* and *G* to shift the lateral position of the instrument. And finally, these rails are part of a carriage that spans the channel and moves longitudinally. Scales are attached to rail *F* and to the framework near *B* to indicate the lateral and vertical coordinates, respectively.

The apparatus proved to be sensitive, accurate, and fairly easy to operate. Since zero readings on the lateral and vertical scales were taken with the tube resting lightly against the side or bottom of the hull, coordinates could be read within a few hundredths of an inch. Angles were measured to the nearest half degree, and successive readings at the same point agreed if the operator applied a slight force to the adjusting handles to take the play out of the pivots as he read the angles. A crosshair and vernier scale were used to read the velocity-tube differential to the nearest 0.001 ft. Hence the magnitude of velocities around 3 ft per sec was obtained within approximately 1%.

Construction and use of the apparatus were sponsored by Dean F. M. Dawson and Prof. J. W. Howe at the University of Iowa, where the work was supervised by Professors Hunter Rouse and A. A. Kalinske (all members of the Society).

Our Readers Say—

In Comment on Papers, Society Affairs, and Related Professional Interests

Analysis of Slender Angle Girts

TO THE EDITOR: Frequently it is much easier to ask a question than to answer it. As far as I know, the problem here presented has not been approached from a rational analysis, only from an empirical standpoint.

It concerns slender angle girts supporting corrugated siding sheets against wind load. These members are important from their very frequency in construction; their failure can be disastrous. A discussion of their action under stresses imposed by wind load and their connections should be welcome.

In current practice, certain sections are selected for given conditions according to the "judgment" of the designer who assumes their sufficiency and may, for example, employ 4 × 3 × $^5/_{16}$-in. angles spaced 5 ft vertically in 24-ft bays to resist a wind load of 25 lb per sq ft. Investigated as simple beams, such members may indicate flexural stresses exceeding the elastic limit, yet in the structure they do not fail. They are, of course, not simple beams, and an investigation of their behavior under load is far from simple.

Usually these members are connected to steel column flanges (Fig. 1) with two $^3/_4$-in. diameter machine bolts at each end. This connection is, of course, eccentric to the centroid axis of the girt. The bolts enter holes one-sixteenth of an inch greater in diameter than the bolt-diameter, thus providing that much "slip" at each end connection before axial stress in the angle can begin. In the absence of such slip (as in the case of tight-driven rivets, or with "draw" in centering the holes), it appears that axial tension in a girt under design load could shear its end connections off, although eccentricity of the end connection may be counteractive there. Since the eccentricity of the end connection is usually inside the neutral axis of the girt-angle, the axial stress, in the initial stage of deflection, is usually compressive (after the aforesaid $^1/_{16}$-in. slip has taken place). Further deflection may reduce such compression through zero to tension in later stages of the deflection. Thus, it appears that the elastic curve may be defined as parabolic during stages of slip, while it will be defined by circular functions when in axial compression, and by hyperbolic functions when in axial tension.

The corrugated siding is relatively light when compared with design wind loading, and its weight may usually be neglected.

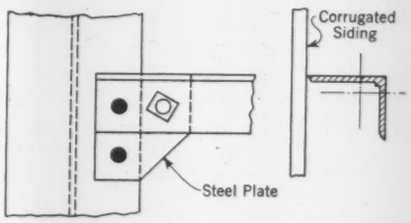


FIG. 1

Under wind load alone, however, the deflection will be oblique—inward and upward (or downward), depending upon the turning of the vertical leg of the angle downward (or upward). Very thin metal straps, attaching the girt to the siding, provide little, if any, restraint against vertical deflection of the girt. Sag rods, usually spaced 4 to 5 ft and extending up to an eave strut, reduce deflections downward, but they cannot reduce any upward component of oblique deflection unless anchored to a curb-beam at the bottom of the siding, or unless vertically adjacent girts are "paired"—that is, have the vertical leg turned up and down alternately. Such provisions are seldom made, however.

Since the siding bears against the toe of the outstanding leg of the angle, the wind load subjects the girt to torsional stresses in addition to those just discussed.

The foregoing outline appears to the writer to present an excellent subject for rather careful study. The analysis of this structural element must be as complex as its behavior is unique, and as its occurrence is common in industrial structures. Perhaps other members can give references to the proper solution.

J. C. EARLY, Assoc. M. ASCE
Beaver Falls, Pa.

Hydraulics in Civil Engineering Curricula

TO THE EDITOR: A hearty second to Professor Thomas for his views on the place of hydraulics in the civil engineering curriculum, as set forth in the March issue.

All the various "fields of interest" of the civil engineer (highways, flood control, water supply, and so forth) are superstructures that can be erected on a common foundation of knowledge. Among the piers of this foundation are (1) knowledge of the physical sciences and their applications, (2) knowledge of the social sciences and their applications, and (3) the knowledge gained by experience with men and with things. It should be the primary function of an undergraduate college education to provide the first two piers, reasonably complete, and a modest concept of what some of the superstructures look like.

A section through Pier 1 ought to look something like Fig. 1. Some curricula, however, look more like Fig. 2.

Most civil engineering fields of interest, or superstructures, require support from all seven of the "technique" blocks of the pier. Then, since all these blocks are es-

sential, it is nonsense to argue about their "relative importance." We may still properly ask, however, whether any of the blocks are the major concern of so few engineers as to be "specialties" not deserving much place in a general curriculum. And we may also ask whether any of them are so simple in concept, compared to the others, that they may be given short shrift for that reason.

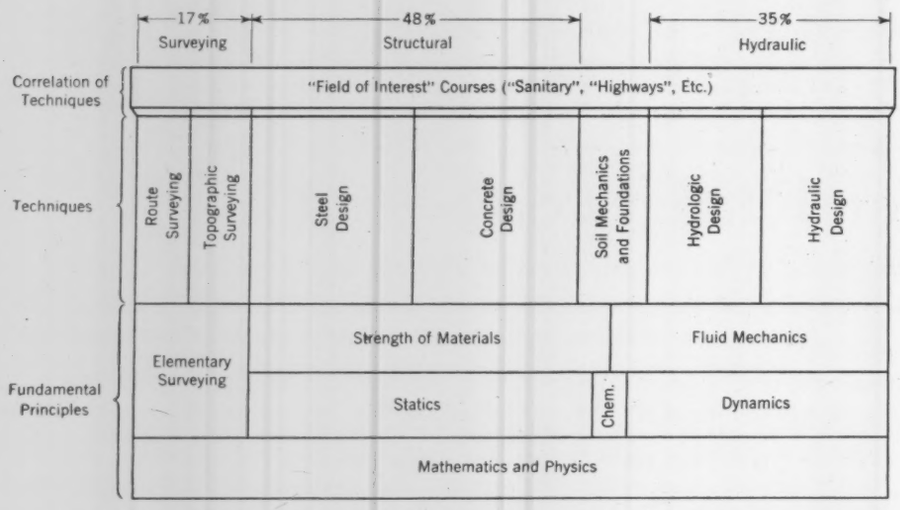


FIG. 1. PHYSICAL SCIENCES AND THEIR APPLICATIONS IN CIVIL ENGINEERING

Percentages at the Top Indicate the Relative Number of Civil Engineers with Major Interest in Surveying, Structural Engineering, and Hydraulics. Widths of Supporting Blocks Are in Proportion to These Percentages, and Hence Not Necessarily a Measure of the Time That Should Be Spent on the Various Courses

As regards the "hydraulic" and "hydrologic" blocks, the answer to both questions is "no." Comparing the membership of three of the Society's Technical Divisions gives a fair measure of the proportionate number of civil engineers whose major interests lie in surveying, structural engineering, and hydraulics. The percentages are, respectively, 17, 48, and 35. We may thus assume that hydraulics is the major interest of three-fourths as many civil engineers as is structural engineering. Or, looking at it differently, note that these three Divisions fairly well cover the civil engineering area. One of the remaining "vertical" Divisions (Soil Mechanics) undoubtedly overlaps both the Structural and the Hydraulic; the other (Economics) overlaps all three; and all the remaining Divisions (like Sanitary) are "horizontal" and represent "superstructures" rather than parts of the pier. Thus it can be stated that in slighting the hydraulic "technique" blocks we are failing to open properly almost a third of the doors of civil engineering opportunity.

As to the second question: Is hydraulics so simple in comparison with structural design that it may be dismissed with one basic course? Observe in Fig. 1 the relative levels of the "fluid mechanics" and the "strength of materials" blocks. A student on completing his fluid mechanics knows just as much about hydraulic design as one completing his "strength" course does about structural—that is to say, practically nothing. To keep the pier leveled up in the "technique" tier he needs to acquire facility in hydraulic and hydrologic design problems comparable in difficulty to those he attacks in the structural field. To teach this material, the amount of time recommended by Professor Thomas appears not at all excessive.

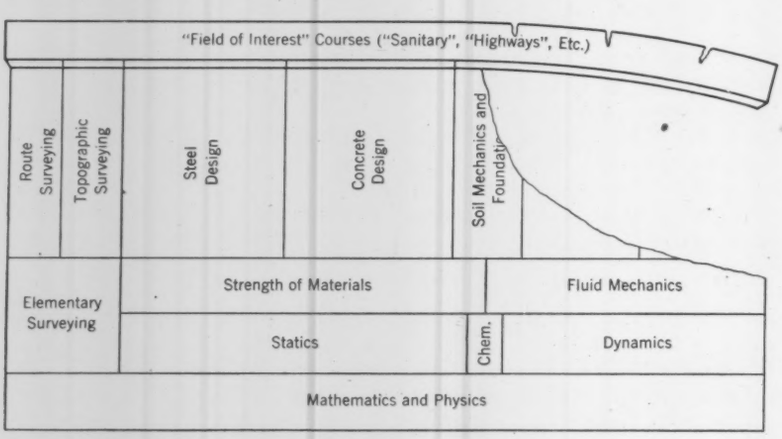


FIG. 2. A LOP-SIDED CURRICULUM IN CIVIL ENGINEERING

Note How Lack of Support from the "Technique" Tier Causes the Superstructure to Sag. Teaching of Any "Specialties" Cannot Be on a Uniformly High Plane in All Aspects in This Case

In conclusion, another second to Professor Thomas for his views on the current fads in teaching fluid mechanics. The thesis that "hydraulics ought to be the same for the civil engineer and the mechanical engineer" is tenuous at best, and in a curriculum that includes only an introductory course in the subject it is definitely harmful. Educators have been so busy broadening the stream of knowledge that they have failed to notice they are no longer maintaining a navigable depth. "Hydraulics for civils" does not mean a trade-school course; it means a thorough grounding in the fundamentals that are essential to us, as contrasted with a superficial examination of areas that to most civil engineers are of academic interest only.

DON JOHNSTONE, Assoc. M. ASCE
Asst. Prof. of Civil Eng.
Ohio State University
Columbus, Ohio

Early Parkways in the New York Area

DEAR SIR: In his article in CIVIL ENGINEERING for April, Mr. Chapin says "It was not until 1939 ... that the full significance of traffic trends was realized by many." This is only a partial truth.

In 1915 the Bronx River Parkway was designed and laid out in an attempt to solve the traffic problems of the New York City approaches. It was the first attempt in this country to provide a highway free from crossings at grade. Jay Downer, M. ASCE, is entitled to much credit for this as is also Westchester County. This was followed by the Saw Mill River and Hutchinson River parkways, all built by Westchester County.

In the middle nineteen twenties Route 1 Extension (now Route 25) was built between the Holland Tunnel and Elizabeth under the writer's direction, with William G. Sloan, M. ASCE, as state highway engineer of New Jersey. These works, the traffic problems involved and the principles underlying their design, were described in various engineering papers and were known to many long before 1939.

In fact, by 1930 there were many other important highways—the Taconic State Highway, the Merritt Parkway, the Long Island Parkways—all envisaged or under way in the vicinity of New York City. Whether the "full significance" of the highway traffic problem is realized even today is a moot question.

FRED LAVIS, M. ASCE

New York, N.Y.

Thoughts of a Civil Engineer

TO THE EDITOR: I presume that ever so often all of us have some thoughts about engineers and engineering, but very seldom do we put such thoughts on paper. I felt an inclination to do something of the sort the other day and this is the result.

THE CIVIL ENGINEER—AN APPRECIATION

Knowing the true tests of the true professions—

To learn and serve first,
to receive and consider self last;
To follow highest ideals and the true
without swerve or fear of hurt;
To be strong and firm and bold,
while understanding, considerate and deeply
sensitive;
To possess sympathy, loyalty and integrity and
to dispossess the heart of arrogance, conceit
and hate;
To know the worth of experience
and to share fully with youth;
To know the nobility of God fear:

The Civil Engineer

Opens the way to new lands,
Smooths the road,
Bridges the depths,
Speeds the traveler,
Quenches the thirst,
Dissipates the foul and unclean,
Conquers the torrent,
Brings to life the waste and inert,
Spends with thrift,
Builds for good,
Knows beauty and strength in that which works
and serves,
Makes tools of arts and science and honored
words,
Graces the banquet as well the humble table,
Is strong with the mighty, mild with the meek,
Gives all for war but more for peace,
Wants nothing but that which follows opportunity and the thrill of accomplishment.

And in so striving and doing,
He measures true to his profession old
But ever new.

ENOCH R. NEEDLES, M. ASCE

New York, N.Y.

Graphic Aids Valuable in the Classroom

DEAR SIR: Fortunate the student in Professor Haines' classes (see his article in the April issue of CIVIL ENGINEERING), for he can see graphically before him the Cooper-loading problem while it is being explained. This "device for classroom demonstration," as it is called, is similar to many graphic aids to instruction known in the Army as "training aids."

In order to present a true picture of the subject matter rapidly and effectively, Army instructors invented and manufactured training aids to demonstrate everything from "how to crimp a blasting cap to a fuse" to "how to estimate the number of panels in a Bailey bridge." These aids proved to be very useful in illustrating some of the problems which trainees were required to master.

There are many computations in engineering which cannot be described by wood, rope, and paint. However, as Professor Haines has shown, certain fundamentals can be put across more rapidly when presented in this attractive manner. It is believed that the time expended in fabricating such training aids will well repay the college instructor in class interest and in time saved for more advanced problems.

PAUL L. NICHOLS, Assoc. M. ASCE
Bridge Designer, Nevada
State Highway Dept.

Carson City, Nev.

Suggested College Curriculum in Hydraulics

DEAR SIR: From his experience as a young civil-hydraulic engineer rather than as a relatively new member of the teaching profession, the writer is anxious to add his indorsement to Professor Thomas' article in the March issue ("Hydraulics Courses Important in the Civil Engineering Curriculum"). Professor Thomas' suggestions for a revised civil engineering curriculum of hydraulics courses are generally in line with a tentative program recently proposed by the writer, as follows:

1. A minimum of two quarters of theoretical hydraulics. This basic course will include (1) a three-hour lecture course in elementary fluid mechanics; (2) a two-hour lecture course in fluid measurements and hydraulic machinery; and (3) a one-hour laboratory course which will supplement the second-quarter lecture course. As none of the existing textbooks on hydraulics or fluid mechanics will be exactly suited to such a course, it is anticipated that one of the recent texts on elementary fluid mechanics can be supplemented with library references and manufacturers' literature on pumps and turbines.

2. As an undergraduate or graduate elective, two quarters of "Applied Hydraulics" each quarter to consist of one hour of lecture and one three-hour computing period per week, for two hours' credit. This might be called a "handbook" course, including a review of elementary principles and the application of those principles to the analysis and solution of problems frequently encountered in hydraulics engineering.

3. As an undergraduate or graduate elective, an advanced laboratory course which will deal with the demonstration and analysis of complex flow phenomena, advanced laboratory techniques, hydraulic models, and investigations of pump and turbine characteristics. This course will consist of one hour of lecture and three hours of laboratory for two hours' credit.

4. As graduate electives, two complementary 3-hour lecture courses covering hydrology and water power engineering.

Obviously, only the first, two-quarter course in elementary fluid mechanics, fluid measurements, and elementary hydraulic machinery is of such general scope that it might be adapted to any field of engineering. The courses carrying graduate credit are quite properly directed toward traditional civil engineering practice.

One has only to refer to our own TRANSACTIONS, count therein the papers devoted particularly to hydraulic engineering, and then check those that are selected for Society prizes, to get a rough idea how present-day hydraulic engineering stands out as one of the most important and, obviously, one of the most active branches of the profession.

The modern hydraulic engineer should recognize the recent advances in theoretical knowledge as a means of interpreting and extending the vast experimental and practical knowledge which he inherits from his predecessors. A new science has not been born, however, for as a traditional and legitimate branch of civil engineering science, "hydraulics" includes but is not replaced by "fluid mechanics." The progressive engineer, no matter what his vintage, will keep abreast of the science so long as he is properly informed—through our technical journals as well as through texts which are written with a knowledge and understanding of his problems.

C. E. KINDSVATER, Jun. ASCE
Assoc. Prof. Civil Engineering

Atlanta, Ga.

A Correction—Testing the Birchenough Bridge

[AN unfortunate misprint in the letter of H. Shirley Smith, M. ASCE, as published in the March issue (page 128), gave incorrectly the source of certain English experimentation. According to Mr. Smith, the wind tunnel tests on models of the Birchenough Bridge, which he referred to, were carried out in London in 1934 under the direction of Ralph Freeman, M. ASCE, the consulting engineer for the bridge. *Editors*]

SOCIETY AFFAIRS

Official and Semi-Official

Valley Authorities Discussed by President Horner

VALLEY Authorities have their places, but their principal usefulness consists in coordinating the work of existing subdivisions of government, and they should not be permitted to become autocratic, paternalistic powers with ever-spreading functions. This thesis was reemphasized by W. W. Horner, ASCE President, in an address on "Utilization of Our Rivers in the Public Interest," delivered before the Annual Meeting of the American Water Works Association in St. Louis, Mo., on May 9. Mr. Horner stressed the fact that he was not speaking as President of ASCE, but as "a citizen and taxpayer of the United States, and by choice as a member of no pressure blocs."

Restating the principles enunciated in an article on the same subject on which he collaborated with J. C. Stevens, Past-President of ASCE (CIVIL ENGINEERING for April 1945, page 182), Mr. Horner stated, in part:

"The public interest, in so far as utilization of our rivers is concerned, requires that what is done be shown in advance to be economically justified, be the best of several imaginable alternate plans, and give some consideration to equitable distribution of the cost among the beneficiaries."

He decried the fact that some provisions of the bill creating the Tennessee Valley Authority were "based on an assumption that the Tennessee Valley had a degraded population, incapable of looking after itself and probably incapable of improving its condition even in light of the developments proposed." The people of the Columbia River Basin and the Missouri Valley, Mr. Horner stated, appear to be living on a relatively good economic standard, certainly not that of a degraded or depressed population. He conceded that as a "noble experiment" the TVA project "may be classified as a distinct success," but contended that the paternalistic aspects are not essential, and that the principal justification for such Authorities is as "referees" to coordinate the plans prepared by other governmental agencies.

"With the functional plans prepared previously by various federal and state agencies, something approaching a new authority appears to be necessary. Not only has our experience indicated that such a coordination is practically impossible as between the agencies of interest, but from the very background of human nature an independent and somewhat authoritative referee would seem to be essential.

"Each of the agencies must necessarily approach this task with a strong pride in the results of its creation, a distinct unwillingness to sacrifice any features of its plan, and a very definite tendency, from the complex of the bigger and better department, to have the greatest possible part of the plan fall within its field of responsibility. Out of these human traits, and without disparagement of the capable engineers and fine gentlemen in the rival camps, something approaching a horse-trading procedure is the best that would be likely to be achieved by direct action between the parties; there could be no assurance that the result would be, or would be shown to be, the best possible conclusion from the interest of the general public."

Citing that "the average taxpayer has difficulty in becoming informed, and even when he develops strong opinions as to the public interest, finds no existing organization through which they can be expressed," Mr. Horner suggested that "possibly the organized engineering profession may be the agency most nearly in an independent position and most capable of developing a sustained objective viewpoint."

COMMITTEEMEN FOR THE RECENT SPRING MEETING OF ASCE IN PHILADELPHIA

Left to right, seated: L. D. Matter, District Engineer of Pennsylvania State Health Department, Harrisburg, and Chairman of ASCE Registration Committee; Francis S. Friel, Albright and Friel, Philadelphia Consulting Engineers, and President of the Philadelphia Section; Charles A. Howland, Philadelphia City Planning Commission, and Secretary-Treasurer of the Philadelphia Section. Standing: John Gittins, Pennsylvania State Health Department, Wilkes-Barre; Neville C. Courtney, Philadelphia Consultant; Viggo Hansen, Philadelphia Electric Company; S. T. Carpenter, Swarthmore College, Pa.; Lyle L. Jenne, Philadelphia Bureau of Water; Howard K. Preston, University of Delaware, Newark, Del.; Bernard S. Bush, State Health Department, Wilkes-Barre, Pa.

Attention to Bloom Bill Urged

ALL MEMBERS of ASCE have been notified that a bill presented before the House of Representatives, H.R. 4982, commonly called the Bloom Bill, should have the special attention of all engineers. As a reminder the letter is printed here.

"Federal legislation identified as H.R. 4982, the 'Bloom Bill', is now under consideration in the National Congress. H.R. 4982 contains provisions of vital interest to all engineers. It is possible that this particular Bill may not achieve strong support in Congress but the objectives of it appear in part to be involved in several other proposed bills.

"The Executive Committee of ASCE wants every member of the Society to read the bill and to reach his own conclusions. You are urgently requested to send a letter or a postcard to either of your Senators and to the Congressman from your Congressional District and ask each to mail you a copy of H.R. 4982.

"Your Society is not requesting you do more than ask for copies of this proposed legislation and to read it. Any further action in the matter is on your initiative. Time is of the essence. Please mail your requests NOW."

Economics for Engineers

Advice on Matters of Public Interest Needed

APPROACH of the national debt to the 300 billion mark is one of many factors of political and economic significance of which the engineer should become cognizant and about which he should be doing something.

This was the keynote of an address delivered by J. C. Stevens, immediate Past-President of ASCE, before the Engineers' Club of Philadelphia during the Spring Meeting of the Society in that city. In addition to members of the club, more than 100 members of ASCE Student Chapters, attending the Student Chapter Conference, were present at the luncheon at which Mr. Stevens spoke. He was awarded the club's Speaker's Medal at the conclusion of his address.

The economic status of the engineer is linked closely with his status as a citizen of the United States, Mr. Stevens said in discussing the national debt and other phases of the economics and laws which prevail today.

"A national debt of 300 billion dollars, which is what it soon will be, is the largest debt ever contracted by any nation," Mr. Stevens said. "It represents the cost of World War II, plus the accumulated deficits of previous years, in which budgets were unbalanced. It would pave, with ten-dollar bills, a highway, 26 ft wide, extending entirely around the earth. If 100 persons started counting ten-dollar bills at the rate of two per second and worked at it steadily 40 hours per week, it would take them 20 years to count that sum. It represents a debt of $2,220 for every man, woman, and child, or about $10,000 per family in the United States. It is twice the national income and practically equivalent to the national wealth.

"That debt has to be paid. Some would have us believe that since we owe it to ourselves it doesn't matter. What of the billions of war bonds held by the millions of people in the country? Are we going to say to them: 'Thanks for the money; the war is over; the bonds you bought represent the cost to you of winning the war; just burn them?'

"Of course this debt has to be paid, and it will be paid. Our great concern, however, must be to see that it is paid with earned American dollars—not printing-press dollars.

"There is only one way in which this debt can be paid honestly; that is by greatly expanded production under a competitive system of free enterprise. It must not be paid with printing-press money, which could easily be the 'least-resistance' method adopted by a federally controlled economic system, and which surely would spell inflation.

"As a matter of fact, the specter of inflation is already stalking through the land. Courageous measures must be taken at once to halt this progress. In 1937, the nation's currency and demand deposits were 34 billion dollars. By 1945, they had risen to 121 billion. This means that our currency supply has already been increased in eight years by three and one-half times.

"If production had remained at the 1937 level, the average of prices in 1945 would be three and one-half times the average of prices in 1937. But the saving factor was that production was doubled during that eight-year period so that the actual index of inflation—to coin a term—is not 350%, but 175%, which pretty nearly coincides with the present state of affairs, in which prices have risen about 75% since 1937."

Decrying controls and subsidies, particularly in connection with the building industry and the procurement of homes for veterans, Mr. Stevens asked:

"But of what value is a house without a job? Provide the veteran a job through industrial production and he will soon have a house—the kind he wants. There was a shortage of housing after World War I, but private enterprise rose to the occasion and the demand was soon supplied. American enterprise today stands ready to build all the houses that are required if we will only give it a chance, and the cost will be less than the prices fixed by government, after adding in the subsidies, because private enterprise is far more efficient in its operations than any government bureau. And the law of supply and demand must be re-invoked if we are to recapture the productive capacities of which we have proved ourselves capable in the past.

"In their most flourishing days, Nazi Germany, Fascist Italy, and Communistic Russia were unable even to approach the production per man-hour of the American plan of competitive free enterprise under a system where the profit motif stimulates industry to furnish the service and the commodities that the American citizen demands. Rewards for thrift must not be abrogated, nor can we afford to continue to penalize the thrifty and award premiums for inefficiency.

"With his powers of analysis, the engineer must assume his position of responsibility in the nation's efforts to extricate itself from the prevailing maelstrom. The public needs the advice of his analytical mind on all matters of public interest, and it will be a certain omen of an enhanced standing of the engineer when he takes an active interest in public affairs.

"At the peace conference held last year in San Francisco, all the service clubs, most professions and religious organizations, were asked to send representatives to serve in advisory capacities, but not one representative of a national or local engineering group was invited. Why was the engineer omitted? He just didn't seem to count in the councils of the world.

"He has not made himself indispensable. He will have to overcome his natural modesty and get in on what is going on. Whenever an engineer has made an outstanding success in his profession, he is sure to be one who is in the thick of affairs and devotes a reasonable portion of his time and energies to public service."

Mr. Stevens described briefly the work of the Engineers' Joint Council, particularly in regard to the economic status of the engineer, and in connection with the subject of collective bargaining he expressed his opinion that "the engineer must organize comprehensively. It is his only defense against being dominated and bargained for by the mediocres of the profession who are forced to join labor unions."

Speaking directly to the engineer, Mr. Stevens concluded:

"If you have convictions on legislation, don't hesitate to write your Congressman. A legislator will pay far greater attention to personal letters from his constituents than to resolutions from pressure groups. Don't keep your nose to the grindstone always, but sit up and take notice of what is in the air. If you don't like the way things are going, do something about it. You'll soon find your advice and counsel will be solicited on every important enterprise."

Engineers Represented on Education Committee

AT THE FIRST meeting of the Citizens' Federal Committee on Education, held in Washington, D.C., on April 8–9, 1946, engineering groups were represented by Everett S. Lee of the Engineers' Council for Professional Development. ECPD is composed of a number of engineering organizations, including the American Society of Civil Engineers.

The purposes of the Citizens' Federal Committee on Education are twofold: first, through its membership of representative citizens, to advise the U.S. Office of Education; and second, through this same membership, to distribute throughout the groups represented information on the services rendered by the U.S. Office of Education.

Besides the U.S. Commissioner of Education, John W. Studebaker, delegates were present from the legal and medical professions—the American Bar Associa-

PART OF GROUP AT COCKTAIL PARTY GIVEN IN HONOR OF COLONEL AND MRS. W. N. CAREY AND MR. AND MRS. MALCOLM PIRNIE BY PUERTO RICO SECTION DURING A RECENT VISIT TO THE ISLAND

Left to right, standing: Felix A. Leon, vice-president of the Section; Pedro Gonzalez-Mena; Kenneth T. Lord; John R. DeLacy, president of the Section; Colonel Carey, ASCE Secretary and Executive Officer; Rafael A. Gonzalez; John H. Fenton; Miguel A. Fernandez, vice-president of the Section; Raoul N. Arroyo, secretary-treasurer of the Section. Seated: Mrs. Fernandez, Mrs. Gonzalez-Mena, Mrs. Carey, Mrs. Gonzalez, and Mrs. Fenton

tion and the American Medical Association. Other fields represented at the two-day session were those of agriculture, business, the home, labor, manufacturing, Negro groups, veterans, and religion. The next meeting of the committee is expected to be held the last week in June.

Films Available for Joint Meetings

IN INCREASING degree, ASCE members are being counseled to assume a more active role in the affairs of their communities, states, and nation.

No less than three speakers touched on this matter during the Spring Meeting in Philadelphia. Congressman Carl Hinshaw of California, a member of the Society, made it the theme of his luncheon address; President W. W. Horner mentioned it in two speeches, and Past-President John C. Stevens stressed the same point in a talk before the Engineers' Club of Philadelphia during the week of the Spring Meeting. All three speeches have been covered in CIVIL ENGINEERING, as have other thoughts on the subject by Professor Franklin Thomas, former Vice-President of ASCE (Public Relations for Engineers, February 1946, p. 88).

"Get acquainted with your neighbors; take an interest in non-technical matters; don't wait to be consulted, but make it known that you and your knowledge and skill are available in the solution of common problems." This is the gist of the advice being given.

Taking the first step first—"get acquainted with your neighbors"—Society Headquarters has inaugurated a program designed to assist Local Sections and their members in this phase of the Society's public relations program. It has been decided to make our films, showing the work of civil engineers in war and peace, available to groups other than Local Sections and Student Chapters.

There are nine excellent Navy films, for the showing of which arrangements have been in existence for some time, through the cooperation of the Bureau of Yards and Docks, as well as some other films showing peacetime civil engineering projects. The practice has been to loan them without charge only to officers of Local Sections and Student Chapters, because of the responsibility involved, and to make those officers responsible for the early and safe return of the films to Headquarters in New York.

Now the films are to be made available to other groups—civic and luncheon clubs, etc.—but through the Local Sections of ASCE. In other words, the officers of the Local Sections will continue to be responsible for the films, but will not be restricted to showing them only to ASCE members.

In fact, they are being urged to arrange joint meetings with other organizations for the showing of the films, or to offer to present the films, together with a short talk outlining the functions of civil engineers and the ASCE Local Section, to any interested organization. Such talks, of course, need not be confined to presentation by officers. Any members interested can and should make them, as well as cooperate in making arrangements for joint meetings of the Local Sections with other groups of which they are members, or in which they have friends.

On a small scale, this procedure has been tried. The reception has been uniformly good, and it is hoped the practice will catch on in all sections of the country. Efforts are being made to obtain more films for this kind of showing.

Because of the time required for dispatching the films, and because it is desired to avoid disappointment over inability to obtain films in time for a specific meeting, the following, from the letter originally sent Local Section officers at the time availability of the films first was announced, bears repetition:

"All are 16-mm sound films, and can be used only on a sound film projector of 16-mm size. All requests should be directed to Society Headquarters, 33 West 39th Street, New York 18, N.Y. To be certain that previous reservations for use of the film you particularly want have not been made, you should send in your request at least four weeks prior to the date of showing. Of course, the sooner reservations are made, the better the chances of having the film for the desired date. In the event that the particular film chosen has been previously reserved, it is advisable to indicate an alternate choice of film."

Society Convention of 1883

Now that members are beginning to make plans for attending the Society's Annual Convention in Spokane, Wash., in July, interest attaches to the following circular letter which was sent to about thirty engineers in Minneapolis and St. Paul in April 1883. Preparations were then in progress for the Society's Annual Convention held in Minneapolis–St. Paul in June of that year. Another Society Convention was held there in June 1919, and a Fall Meeting was held in St. Paul in October 1931.

This historic letter, which was spotted by William N. Carey, Secretary and Executive Officer of the Society, in the files of the Minneapolis Engineers' Club, reads as follows:

Minneapolis
April 30, 1883

"*Dear Sir:*

"You are respectfully invited to meet the engineers of this city in the Board of Trade Room in the City Hall on Friday, May 4, at 7:30 p.m. to consider the question of appointing a committee to join with those of the Board of Trade and Chamber of Commerce in making preparations for the entertainment of the American Society of Civil Engineers in June.

"The subject of forming a local Engineers' Club will also be discussed.

"(*Signed*) ANDREW RINKER, *City Engineer*
"WM. A. PIKE
"E. F. ABBOTT"

NOTES FROM THE CAPITAL

Occasional Information Transmitted by the Society's Washington Representative and Believed to Be of Special Interest to Civil Engineers

Airport Act Authorizes $500,000,000 of Federal Aid

By EVERETT C. CRITES, Assoc. M. ASCE
SENIOR AIRPORT ENGINEER, CIVIL AERONAUTICS ADMINISTRATION

AIRPORT development in the United States will be materially advanced with the 500 million dollars authorized by Congress to be spent on federal-aid programs. The Federal Airport Act became law on May 13, immediately making available for appropriation three million dollars for preliminary planning and surveys. The remaining funds are to be spent over a 7-year period beginning July 1, 1946. The maximum amount to be expended in any one year is set at $100,000,000. In addition, $20,000,000 is authorized over a 7-year period for airport development in Alaska (10 million), Hawaii, and Puerto Rico (5 million each).

Provisions of the Act will be carried out by the Civil Aeronautics Administration. However, all engineering, including surveys, preparation of plans, award of contracts, and construction inspection will be delegated to sponsors of airport development projects.

ANY PUBLIC AGENCY MAY SPONSOR PROJECTS

Any public agency, or two or more acting jointly, may submit a project application. In many cases, communities will act jointly with their state aviation authority, especially in those states where state aid will be granted. Federal aid for development of Class III or smaller airports in the States, Hawaii, and Puerto Rico shall be 50% of the allowable costs of the project. Larger projects may receive an amount deemed appropriate to the Administrator, not to exceed 50% of the allowable costs.

Sponsors of projects are required to assure the Administrator, in writing, that:

(1) the airport will be available for public use;
(2) it will be suitably operated and maintained;
(3) the aerial approaches will be adequately cleared;
(4) the airport will be available to U.S. Naval and military aircraft without charge, except in case of substantial use, a reasonable proportional share of ordinary costs;
(5) space will be made available to the U.S. for weather-reporting activities, etc.;
(6) accounts and records will be kept in accordance with standards prescribed by CAA;
(7) airport operators will submit annual or special reports to the administrator;
(8) airport records will be available for inspection by CAA.

PLANNING COST AN ALLOWABLE EXPENSE

Allowable costs in determining federal aid include those incurred subsequent to enactment of the Act and a grant agreement with CAA; also planning costs and expenses for acquiring land which would not have been incurred otherwise but which may have been incurred before enactment of the Act and execution of the grant agreement. The Administrator of CAA has broad powers in determining allowable costs, which must be reasonable in all cases. Expense of constructing administration buildings, but not hangars, is considered an allowable cost.

The pattern of civil airport construction will follow general and basic engineering principles and standards established by the Civil Aeronautics Administration. Nevertheless, the services of many competent private engineers will be required to prepare and execute detailed plans for the design, construction and maintenance of civil airfields. The sponsors will have jurisdiction in selecting and employing this engineering service.

Qualifications of Veterans Clarified

MEMBERSHIP qualifications in ASCE for engineers who have had military experience have been defined by Chairman W. D. Shannon of the Membership Qualifications Committee. His statement, contained in a letter to William N. Carey, Secretary and Executive Officer of ASCE, is quoted here:

"Frequent inquiries have been made at Society Headquarters since V-E Day as to the weight given military experience when application is made either for membership or transfer. Many men who have been in the Service during the past four years have found that their technical records have been short of sufficient requirements to give them the advancement in membership they desired. Frequently such applicants have included experience of a non-technical nature.

"The Membership Qualifications Committee, while endeavoring to be liberal in its interpretation of experience records, recognizes the personal equation in the applicant's technical record and his desire to be fair in his own attempt at classification.

"The By-Laws of the Society specifically state the degree of responsibility expected of the applicant before admission or transfer to any grade.

"Responsible charge of engineering work means exactly that, regardless of whether such work was performed by the U.S.E.D. in Alaska, by the Seabees in Okinawa, or by a private engineering firm in the United States. There is neither penalty nor bonus for such engineering work performed under military direction. Responsible charge of the design or construction of important engineering structures is, therefore, a proper qualification for membership. To be in responsible charge, the applicant must be more than a draftsman, an inspector, or an instrumentman. To begin with, he should have a technical training which will fit him for engineering leadership. A Junior should be able to exercise a limited amount of such leadership, but an Associate Member should be able to accept the technical direction of relatively large and complicated engineering structures. Members should have longer experience and be able to direct engineering works commensurate with the highest responsibilities of the profession.

It is evident, therefore, that military experience that does not involve the design or construction of important engineering works cannot be considered by the Society as qualification for either membership or transfer. Applicants are urged, however, to include all their experience, but to set apart the time spent in non-engineering work. It has been the policy of the Society that where a Junior has reached the age of 35 during his military experience, and has not, therefore, been able to obtain the required year in which he had responsible charge, the deadline year (that is, 35) may be extended by the number of years the Junior was in non-engineering military service."

Appointments of Society Representatives

F. B. FARQUHARSON, M. ASCE, has been appointed to represent the Society at the Sixth International Congress for Applied Mechanics to be held in Paris, September 22–29, 1946.

L. VAN HORN FISHER, M. ASCE, was appointed Society delegate to the inauguration of Ralph Hutchinson as eleventh president of Lafayette College.

Report on Japanese Industrial Disarmament Due Soon

A SECOND technological, non-political program to eliminate the industrial war potential of aggressor states—this one for Japan—is nearing completion under the direction of the National Engineers Committee of Engineers Joint Council, and this month will be presented to the War, Navy, and State departments, which requested it.

In process of preparation since last September, when the first such report, covering Germany, was transmitted to the Government, the report on Japan embodies a program based on engineering, industrial, and economic factors, and represents the combined thinking of the engineers comprising the committee.

Engineers Joint Council is comprised of the presidents, immediate past-presidents, and secretaries of the five major engineering societies, namely, the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Chemical Engineers.

Malcolm Pirnie, Past-President of ASCE, is chairman of the executive committee of EFC, under the direction of which the National Engineers Committee functions, and Col. Carlton S. Proctor, a member of ASCE, is chairman of the committee preparing the report. Other members of the National Engineers Committee are Dr. Foster Bain, Charles W. E. Clarke, Sidney D. Kirkpatrick, Dr. Harry S. Rogers, and Dr. R. E. Zimmerman.

The report on Germany was hailed by Government officials as an outstanding contribution of the engineering profession to the future peace of the world, and late in March of this year the program for permanent demilitarization of Germany was accepted by the Allied Control Council in Berlin.

Sixteen working committees, composed of American engineering and technological specialists in their respective fields, all of them highly placed in American industry, are cooperating in the preparation of the report and recommendations covering Japan. The program will deal with the limitation of metal products, chemicals, power, mineral resources, and other elements of war-making potential.

"The acceptance in principle and in its main essentials by the Allied Control Council of the National Engineers' program for the industrial disarmament of Germany, lends additional significance and importance to a similar plan for curbing the war potential of Japan," said Colonel Proctor. "The German plan rigidly restricts or entirely prohibits German industry adaptable to war purposes, but curbs are selective in order to provide for the normal requirements of the country's peacetime economy and to avoid a disastrous economic vacuum.

"The plan now being developed to render Japan militarily impotent is based on the same principles. It is impossible to forecast as yet, until all the reports of the task committees are submitted and analyzed, the exact extent to which Japan should be industrially restricted or in precisely what respects. Her situation is somewhat different from that of Germany. But the program is expected to include complete prohibition of such war-making potential as warships, planes, munitions, certain heavy industries, and limiting others, but at the same time encouraging recovery of Japan's normal economy by not curtailing capacity in peaceful occupations. Data are now being gathered in this country and in Japan.

NON-POLITICAL SERVICE BY ENGINEERS

"The engineering profession in the United States has welcomed the opportunity for public service in the industrial disarmament of aggressor states by making recommendations wholly non-political in their nature and based solely on the experience and judgment of top ranking men in engineering and industry. We have been informed that weight was attached to the program proposed by the Committee for Germany because of the non-political nature of its recommendations and their solid basis of technological, engineering and industrial experience. We venture to hope that the report as to Japan may be similarly received."

Army Honor to Colonel Carey

WILLIAM N. CAREY, Secretary and Executive Officer of the American Society of Civil Engineers, has been awarded the Army Commendation Ribbon for "the construction at Army and Navy installations, and in war-congested communities, of public works essential to the efficient conduct of the war."

In transmitting the award, Maj. Gen. Philip B. Fleming, Administrator, Federal Works Agency, under whom Colonel Carey served from March 1, 1942, to June 1, 1945, cited the Colonel for being "prompt in decision and energetic in action at a time when speed in the execution of the program was of greatest urgency." The term of duty and commendation cover Colonel Carey's successive activities in charge of the War Public Works program of the Federal Works Agency, as its Chief Engineer and chairman of its Program Review Board.

In part, the citation commends Colonel Carey as follows:

". . . . As Chief Engineer of the Agency,

TRAVELING FROM CENTRAL AMERICA TO STUDY ROAD BUILDING IN THE UNITED STATES, FOUR ENGINEERS MADE SPECIAL EFFORT TO ATTEND THE SESSIONS OF THE HIGHWAY ENGINEERING DIVISION AT THE RECENT PHILADELPHIA SPRING MEETING

At Philadelphia the men were guests of Frank H. Gardner, Assoc. M. ASCE, Highway Engineer with the Public Roads Administration and formerly Locating Engineer on the Inter-American Highway. In this photo, taken in the course of the engineering excursion, the Central Americans are in the company of Philadelphia Meeting officials. Left to right, they are: Julio Enrique Obriols, Subdirector General of Highways, Republic of Guatemala; Viggo Hansen, M. ASCE, Excursion Committeeman; Juan de Dios Aguilar, Director General of Highways, Republic of Guatemala; Mr. Gardner; Jose Ugarte, Major of Engineers, Republic of Salvador; L. F. Parlette, M. ASCE, Excursion Committeeman; Simeon Alfaro, Colonel of Engineers, Republic of El Salvador; Francis S. Friel, M. ASCE, President, Philadelphia Local Section

you were responsible for standardizing the technical engineering requirements of the three constituent units of the Agency, thereby contributing out of the wealth of your long experience in public works construction, both of a civilian and military character, to the smooth functioning of the program despite wartime shortages of many critical construction materials. As Chairman of the Federal Works Agency Program Review Board, you made an invaluable contribution to the development of policies that expedited the Agency's assistance to the war effort, and as liaison between the Agency and the engineering profession and the construction industry you demonstrated effective skill, thus greatly facilitating the timely construction of necessary public works."

CIVIL ENGINEERING joins other staff members and friends of Colonel Carey in congratulating him on this well-deserved honor.

Speakers' Medal Presented to John C. Stevens

PAST-PRESIDENT John C. Stevens was awarded the Speakers' Medal of the Philadelphia Engineers' Club at the time of the Society's recent Spring Meeting in Philadelphia. The medal was presented to Mr. Stevens after he had addressed the Club at a luncheon. Special guests of the Club on this occasion were members of ASCE Student Chapters who were attending the Student Chapter Conference held in connection with the Spring Meeting.

Sometimes called the George Washington Medal, the medal presented to Mr. Stevens is awarded by the Club on rare occasions to guest speakers whose achievements in the engineering profession are deemed outstanding. The presentation was made by Edwin Elliott, president of the Philadelphia Engineers' Club, and by Francis S. Friel, president of the Philadelphia Local Section of ASCE.

This address of Mr. Stevens before the Philadelphia Engineers' Club, and one by Director William D. Shannon of Seattle before the Lions Club of Philadelphia, were made as part of the Society's new public relations program. One phase of this program is to acquaint other organizations with the work of civil engineers by means of talks given by ASCE officers and Directors.

Death of Oldest Dunlap Son

THE MANY Society members acquainted with Secretary Dunlap's family will be grieved to hear of the death of George S. Dunlap, oldest of three sons. He was 28 years of age. For a number of years he had been living at Enosburg Falls in northern Vermont. Death occurred as a result of an automobile accident April 20. He was alone in the car at the time of the mishap. The surviving brothers are Richard S. Dunlap of St. Albans, Vt., and Clark G. Dunlap of Stratford, Conn.

Veteran's Guide Used in Career Counseling

VETERANS interested in a career in the construction industry are receiving many helpful suggestions from the booklet, "Opportunity Unlimited," which is being circulated by the American Society of Civil Engineers. A good example of its effective use was related by Day Okes, M. ASCE, before a meeting of the Construction Division in Philadelphia.

The booklet is being used extensively by the Veterans Information Center in St. Paul, Minn. Whenever a counselor at the center discovers a veteran's interest in construction as a career, reference is made to the appropriate part of "Opportunities Unlimited." Format and information in the book were specially worked out so as to be helpful in just such instances.

Some 3,000 veterans made use of the facilities of the St. Paul Center during the three-month period ending March 31. Of these "over 75% wished guidance for jobs, education, job training and housing." The booklet proved useful in many of these cases.

The Veterans Center is operated as a cooperative venture, financed and sponsored by organizations representing all interests in the city. The Northwestern Section, ASCE, is cooperating through its state-wide organization, the Minnesota Federation of Engineering Societies.

Back Copies of Society Publications Needed by Veterans and Foreign Libraries

MANY requests have been received at Society Headquarters for back numbers of CIVIL ENGINEERING and PROCEEDINGS—so many in fact that stocks of numerous issues have been completely exhausted. The requests have come from veterans who were unable to receive their copies of the publication during the war and from members residing in other countries who were in inactive status during the same period.

It is requested that wherever duplicate copies are available or where other circumstances permit, any of the copies listed below be returned to ASCE Headquarters, 33 West 39th Street, New York 18, N.Y., for distribution to those seeking the information they contain.

CIVIL ENGINEERING

1940—January, February, March, April, May, July, August, November
1941—January, February, March, September, November, December
1943—January, March, April
1944—January, February, March, May, July, November, December

PROCEEDINGS

1940—January
1941—January
1942—November
1944—January, February, March, September
1945—January.

Registration by Endorsement

ENGINEERS who are endorsed by their State Board of Registration for Professional Engineers and the National Council of State Boards of Engineering Examiners will find their applications for registration in the various states are greatly expedited and, in most cases, promptly approved.

The required procedure for securing such endorsements is to file an application for Certificate of Qualification with the National Bureau of Engineering Registration, which will secure the endorsement of the State Board of Registration and, after verifying the professional record of the applicant, will also affix its endorsement, and the seal of the National Council.

The National Bureau of Engineering Registration is operated as a function of the National Council of State Boards of Engineering Examiners, under the direction of a standing committee of the Council, with an Advisory Board of representatives from national engineering societies. It was established primarily to minimize the effort and expense of engineers desiring to secure registration of license in more than one state. The Bureau also constitutes a clearing house for state registration authorities, employers, societies, and others, acting as a reliable source of verified information regarding the professional records of engineers.

The By-Laws of the National Council and the registration laws or regulations of most states specifically provide for recognition of Certificates of Qualification issued by the Bureau, and all Member Boards of the National Council accept certification by the Bureau, with endorsement by a State Board, as competent evidence of qualification for registration.

In several states whose laws are based on the Model Law, the usual $25 fee is reduced to $10 for registrants who hold such certificates. It is interesting to note that several engineers certified by the Bureau have secured registration in as many as thirty states.

Engineers desiring legal registration or license in any state should communicate direct with the State Board or Depart-

ment in that state and secure its application form and regulations. Applications for registration by endorsement must be accompanied by photostatic copies of Certificate of Qualification issued by the Registration Bureau.

A registered engineer desiring a Certificate of Qualification will submit to the Bureau on its prescribed form his complete record, including education, engineering experience, legal registration, technical examinations, membership in professional or scientific societies, and references as to character and experience.

An investigation such as that conducted by the Bureau often requires considerable time. It is suggested, therefore, that an engineer should not wait until he actually needs a Certificate of Qualification. He should, in fact, file his application with the Bureau as early as practicable so that certification by the Bureau may be available for presentation to State Boards of Engineering Examiners or Registration with which he desires registration or for other appropriate purposes.

Applications must be submitted on forms obtainable from the Bureau and should be filed with the National Bureau of Engineering Registration, P. O. Drawer 1404, Columbia, South Carolina.

The ASCE representative on the Advisory Board of the National Bureau of Registration is Allen P. Richmond, Jr., member of the Society's Headquarters staff. Not only Mr. Richmond but also the Chairman and the Secretary of the Registration Bureau's Standing Committee are members of ASCE.

Honor to Division Chairman

CHAIRMAN of the ASCE Sanitary Engineering Division, N. T. Veatch, of the Kansas City, Mo., consulting firm of Black and Veatch, is the new vice-president of the American Water Works Association. Mr. Veatch succeeds Wendell La Due, superintendent and chief engineer of the Akron, Ohio, Bureau of Water and Sewerage, who advanced to the presidency of the Association. Retiring president of the American Water Works Association is L. N. Thompson, general manager of the St. Paul, Minn., Water Department. All three of these men are Members ASCE.

Director Becomes Vice-President of Cornell

A NEW vice-presidency of Cornell University was created by the Board of Trustees at its spring meeting on May 9, to be filled by Dean S. C. Hollister, ASCE Director from District 3. Dean Hollister will continue in his present position as head of the College of Engineering at Cornell while assuming his new administrative duties. As a vice-president he will be in charge of University development.

S. C. HOLLISTER, ASCE DIRECTOR, NEW VICE-PRESIDENT OF CORNELL UNIVERSITY

Among his achievements at Cornell have been the promotion of the new Graduate School of Aeronautical Engineering, a five-year curriculum in all branches of engineering, integration of the new Cornell Aeronautical Laboratory and the high-voltage laboratory into the educational program of the University, and a comprehensive building program for the development of the physical plant of the College of Engineering.

Salary Studies Affect Increases

ENGINEERS in two more subdivisions of government are to receive long deferred salary increases as a result of surveys in which ASCE participated.

They are the employees on the engineering staff of the Maryland State Roads Commission and some of the engineering personnel among the 10,000 employees of the City of Los Angeles, for whom increases have been authorized effective July 1 and June 15, respectively. Earlier this year the Arizona State Highway Commission authorized salary increases for its engineering employees.

Allen P. Richmond, Assistant to the Secretary of ASCE, assisted in the surveys at the formal request of the subdivisions of government involved, with the approval and assistance of ASCE Local Sections in the areas.

The Maryland increases, for the lower half of the professional series and for the entire sub-professional series of engineering positions in the Maryland State Roads Commission, were recommended by the Maryland Standard Salary Board. They range from 96% in the lowest sub-professional grade (junior draftsman), to 36% in the grade of equipment engineer, which is at the level of ASCE Grade VI. Some 20 Classifications between these two positions will receive increases also. In dollars, the range for junior draftsman was increased from $900–$1,100, to $1,760–$2,200, and that of engineers at the level of equipment engineer from $3,600–$4,500 to $4,900–$6,125. The Standard Salary Board is considering further changes in salary ranges for other positions, including those in the higher levels of the State Roads Commission and the engineering staffs of the Public Service Commission and the State Department of Health.

In approving the higher salary schedules, Governor Herbert R. O'Conor stated that the purpose of the new scale "is to retain the services of the engineers now in the employ of the roads commission and to attract more help to the State service."

The Los Angeles City Council action approving the increases for all city employees, as recommended by the Bureau of Budget and Efficiency, was based on provisions of the City Charter making it mandatory for the City to pay the prevailing wage scale in private industry to all its workers. It was emphasized by the Bureau of Budget and Efficiency that the increases were not so-called blanket raises, but are computed on a "step plan." Increases in the higher brackets run from $75 to more than $100 per month, and lower-salaried jobs are increased around $25 per month.

The Problem of Paper

WHO has all the printing paper for publications? Certainly not the Society, nor for that matter any of the Founder Societies or other publications with which the Society is acquainted.

It seems that paper is the prime publication problem of 1946. With the removal of government restrictions at the close of the war it was thought that the problem would resolve itself. If anything, however, it has become worse. Those who feel that the natural operation of economic laws, freed of arbitrary control, will solve our problems are hard put to it to explain away the current situation. If the present paper supply is seeking a natural level, then that level seems to favor only the large users.

The Society, with requirements of only a little over one hundred tons a year, is between the upper and the nether millstones—a limited over-all supply on the one hand, and the ability of some publishers to get an unreasonable share on the other. A sister technical organization, using a thousand tons a year,

reports that it is likewise handicapped. What is more amazing is the statement in the public press on April 3 that the Government Printing Office in Washington was requesting the return of certain war powers in order that even it might obtain vital paper supplies.

Meanwhile, strange to relate, new publications are appearing, sponsored mainly by large organizations. This particular problem gains some clarity from the fact that two large publishers have purchased mills for their own, if necessary, exclusive use. This casts light on the Society problem also, since each of these mills was in the habit of furnishing paper for our PROCEEDINGS and TRANSACTIONS. Old affiliations and old obligations seem to have little weight in the present emergency. The Society is left without recourse to government or other protection.

As a result, conditions are on a day-to-day, hand-to-mouth, basis. Some borrowing from TRANSACTIONS stock is enabling PROCEEDINGS to keep going. What will be the result on the next year's TRANSACTIONS is a difficulty that has to take a secondary place for the time being. CIVIL ENGINEERING, through the good offices of paper dealers and manufacturers, is eking out a bare existence. Supplies, one month at a time, are promised for the present and one additional month. Paper for Manual 27 was secured through the effective help of the Society printer.

The picture is not a happy one. For the time being the Society is assured it can continue its monthly publications. Sizes have been curtailed, but regularity of publication is still possible. On the basis that "misery loves company," there is some consolation in the fact that the problem is not an isolated one. Fortunately, the Society has a good record in its dealings with paper mills, supply houses, and printers. From this it can be hoped, but without assurance, that it can tide over the present emergency until the normal supply of printing paper is again available. This, according to the best authorities, may be some time in 1947.

Board Minutes—Correction

IN the Secretary's abstract of the Board of Direction meetings April 15, 16, 1946, as given in the May issue of CIVIL ENGINEERING, page 220, a correction is necessary. Referring to an item near the end of the page, entitled "Additional Field Secretary," the Board action can best be covered by the following quotation:

". . .the Board authorized the employment of an additional Field Secretary but withheld authority for his employment until the matter could be discussed next October in conjunction with the annual budget for 1947."

News of Local Sections

Scheduled Meetings

FLORIDA SECTION—Dinner meeting at the Seminole Hotel in Jacksonville on June 6, at 7 p.m.

LOS ANGELES SECTION—"Field Day" at the Oakmont Country Club on June 13.

NEW MEXICO SECTION—Convention on June 14 and 15; dinner at Elks Lodge in Tucumcari on June 14, at 6:30 p.m. There will be an inspection of new U.S. Bureau of Reclamation works.

OREGON SECTION—Technical meeting at the Public Service Auditorium, Portland, on June 6, at 8 p.m.

PHILADELPHIA SECTION—Outing at the Bala Golf Club on June 5, at 1 p.m.; dinner at 7:30 p.m.

SAN DIEGO SECTION—Dinner meeting at the U.S. Grant Hotel on June 27, at 6:30 p.m.

SAN FRANCISCO SECTION—Joint meeting with the Structural Engineers Association of Northern California at the Engineers' Club on June 4, at 5:45 p.m. Regular meeting at the Engineers' Club on June 18.

TEXAS SECTION—Luncheon meeting of the Dallas Branch at the Adolphus Hotel on July 1, at 12:15 p.m.; luncheon meeting of the Fort Worth Branch at the Blackstone Hotel on June 10, at 12:15 p.m.

Recent Activities

ALABAMA SECTION

An interesting and diverse program was presented at a recent joint meeting of the Alabama Section and the University of Alabama Student Chapter, which was held in Tuscaloosa. Following an informal dinner—with James Kizzire, Student Chapter president as master of ceremonies—George J. Davis, Jr., dean of the college of engineering at the university, addressed the group. Recent activities and future plans of the Chapter were then discussed by Clyde Laughter, former president of the Chapter, and Roberto Martinez, member of the Chapter. A talk on "Engineering in the South" by L. M. Smith, vice-president of the Alabama Power Company, concluded the technical program. The meeting was well attended by both students and practicing engineers from all over the state.

ARIZONA SECTION

The Arizona Section participated in the annual Roads and Streets Conference —that took place in Tucson on April 26—and on the following day held its own spring meeting. An interesting program had been arranged for the latter occasion by H. C. Schwalen, and the Section presented prizes of Junior membership in the Society to Philip Newlin and Harold Gerdin, graduating seniors in civil engineering at the University of Arizona, for their all-around ability. The Section is a co-sponsor of the annual Roads and Streets Conference.

BUFFALO SECTION

The subject of "Wage-Price Policy," as presented by Dr. Lewis A. Froman before a recent meeting of the Buffalo Section, proved to be a lively topic. Dr. Froman, who is on the staff of the University of Buffalo, illustrated his talk with timely and vital statistics. Also appearing on the technical program was Roy B. Bell, of the local U.S. Engineer Office, who described the Junior Corps of Engineers recently organized at the instigation of Col. Herbert D. Vogel.

CENTRAL ILLINOIS SECTION

"Engineers in Peace and War" constituted the topic of discussion at a recent Section meeting, which was held in Springfield. The principal speaker appearing on the program was Maj. Gen. Leif J. Sverdrup, who has returned to his consulting practice in St. Louis after three and a half years of service in the Pacific area of war. Colored motion pictures of the work of the Corps of Engineers in New Guinea supplemented his talk. A dinner and business session preceded the technical program.

CENTRAL OHIO SECTION

Shortages and the high cost of steel and other materials and an abundance of cheap labor have led to liberal building codes, accurate designing, and the use of prestressed concrete and ultra-thin sections in construction practice in South America, Arthur J. Boase told the members of the Central Ohio Section at their April meeting. Mr. Boase, who is manager of the Structural and Technical Bureau of the Portland Cement Association, pointed out that between these South American practices and our own extravagant use of material is a middle ground that American engineers would do well to explore. He spoke from the vantage point of recent travel in South America.

CINCINNATI SECTION

The control of the Missouri River was discussed by Edgar K. Ruth, housing manager of the Cincinnati Metropolitan Authority, at the April meeting of the Section. Mr. Ruth gave an interesting word picture of the country through which the Missouri flows, and an outline

of the control plans originally proposed by the U.S. Engineer Department and the U.S. Bureau of Reclamation. He held that the combining of the two plans would be of great benefit not only to all of the valley states but to the country at large.

COLORADO SECTION

A talk on the shoran method of map control comprised the technical program at the April dinner meeting of the Section. This was given by Corporal H. C. Hickerson, of the 311th Reconnaissance Wing of the U.S. Army Air Forces. Mr. Hickerson explained that the shoran method is an extremely accurate way of measuring distances on the earth's surface by means of radar. It is based upon the measurement of the sides of the triangle instead of the more conventional method of the determination of angles.

CONNECTICUT SECTION

Some challenging future problems in transportation were described by Kent T. Healy, Thomas DeWitt Cuyler Professor of Transportation at Yale University, at a recent Section meeting that took place in Hartford. As one example of a possible development in connection with water transportation, he cited the LST type of vessel and the possibility that ships may, one day, be loaded and unloaded in a way similar to that employed in the invasions. An enthusiastic general discussion from the floor attested the interest of the group in the subject.

DAYTON SECTION

The Dayton Section held a joint meeting with the Dayton Society of Professional Engineers and the Miami Society of Professional Engineers at the plant of the American Rolling Mills Company at Middletown, Ohio, in April. After a delicious dinner, which was furnished by Armco, short talks were given by Albert Neff and John Coleman, respectively president and vice-president of the Ohio Society of Professional Engineers, and Leo Flotron, president of the Dayton Society of Professional Engineers. Mr. Tranter, superintendent of the east works of Armco, then spoke on the history, background, present facilities, and capacity of Armco, and later conducted the group on a tour of inspection of the plant.

DISTRICT OF COLUMBIA SECTION

An illustrated talk on the Tripler General Hospital was recently presented to the Section by Col. Leonard C. Urquhart, chief of the War Construction Service. This structure, with a present design capacity of 1,500 beds and a future capacity of 2,000 beds, was described as the largest military hospital anywhere, and its cost estimated at about $20,000,000. During the discussion that followed the lecture Col. F. H. Dryden and Mr. Sterling, of the Veterans' Administration, spoke.

DULUTH SECTION

Guest of honor and principal speaker at a recent meeting of the Section was Arthur C. Josephs, whose subject was the construction of a hydroelectric plant of 2,500-kw capacity in the mountains 30 miles south of Guatemala City. Mr. Josephs, who was formerly in Guatemala as an employee of the Electric Bond and Share Company, gave a graphic description of the difficulties of doing construction work in the tropics. The continuous rainfall, the hazards of malaria, snakes, and insect life encountered in clearing the jungle, and the low output of native labor were among the aspects covered.

FLORIDA SECTION

Several Student Chapter and faculty members were guests of the Florida Section for their April meeting, which was held in Jacksonville. Following a short business meeting, Robert Angas, Jacksonville consultant, gave a talk on "Beach Erosion and Shore Protection." Mr. Angas, who had just returned from a conference and field inspection of the beaches at Jupiter Island, near Hobe Sound, discussed the cooperative study now being made for this locality by the Beach Erosion Board of the War Department, and the work involved in securing the necessary data.

HAWAII SECTION

Numerous business matters were discussed at a recent meeting of the Hawaii Section, and a resolution favoring statehood for Hawaii was adopted. New officers, elected during the business session, are: Walter Samson, president; Joseph Kunesh, vice-president; Ben Nutter, secretary; and George Hatch, treasurer. The technical program consisted of a talk by Louis A. Buese, vice-president and executive engineer of the Hawaiian Electric Company, whose subject was "Electric Power for the Island of Oahu."

INDIANA SECTION

With Society President W. W. Horner as guest and principal speaker, the Section and the Purdue University Student Chapter held a joint meeting at Lafayette, Ind., in April, with Student Chapter members from Notre Dame University and Rose Polytechnic Institute as guests. The Purdue Chapter had prepared an interesting program of music and satirical sketches, and during the evening the Section presented its annual prizes of Junior membership in the Society. This year's recipients are William E. Kindle and Ralph Henning Johnson, both of Purdue University. President Horner spoke on the aims and objectives of the Society in improving the economic position and social status of the engineer. A round-table discussion concluded the program.

ILLINOIS SECTION

Speakers at the May meeting of the Illinois Section included John P. McCollum, Deputy Housing Expediter, who described the Federal housing program, and Elizabeth Wood, executive secretary of the Chicago Housing Authority, who discussed the problems involved in slum clearance. Mr. McCollum predicted that the general overcrowding will not be relieved until after the 1947 construction period. He substituted for Charles J. Horan, Federal Regional Housing Expediter, who had been scheduled to speak but was unable to be present.

ITHACA SECTION

A joint meeting of the Section and local groups of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, and the New York State Society of Professional Engineers took place in Elmira, N.Y., on April 5. A talk on collective bargaining—by E. P. Yerkes, of the Bell Telephone Company of Pennsylvania—comprised the technical program. As secretary of the A.I.E.E.'s Committee on Collective Bargaining and Related Matters, Mr. Yerkes explained the engineer's position on the subject.

KANSAS CITY SECTION

There was a large turnout for the annual Ladies' Night of the Kansas City Section, which was attended by President and Mrs. W. W. Horner. During the evening Mr. Horner spoke briefly, emphasizing particularly the desirability of increasing the membership of the Society. A program of music had also been arranged, and a review of Erich Remarque's current best-seller, *The Arch of Triumph*, by the Rev. Herbert H. Duenow, concluded the evening.

LOS ANGELES SECTION

The subject, "The Colorado River: Life Line of the Southwest," was discussed at a recent meeting. E. A. Moritz, who is regional director for the U.S. Bureau of Reclamation, outlined the Bureau's development of the various great dams and reclamation projects along the Colorado and its tributaries. In introducing Mr. Moritz, Julian Hinds, former president of the Section, reminisced on his experiences while working under Mr. Moritz.

Preceding the regular meeting, about 100 members of the Junior Forum and their guests heard R. F. Goudey read a paper on the problems involved in locating industry in Southern California.

Mr. Goudey is sanitary engineer for the Los Angeles Bureau of Water Works and Supply.

MARYLAND SECTION

Unusual experiences encountered in moving freight and passengers by rail during the war period were recounted by John Edwards before a recent meeting of the Maryland Section. Special transportation operations included moving the propellers of the Liberty ships, which were cast in Baltimore, to the West Coast; moving the 50-ft barges, made in the Midwest for the Normandy Invasion, through tunnels in which the clearance was not more than half an inch; and shipping Hitler's captured private train, which was incapable of moving on a greater curve than 7½ deg, from Boston to Fortress Monroe, Va. The showing of two reels of motion pictures, depicting the wartime movement of freight, concluded the technical program.

METROPOLITAN SECTION

Profits from salvage of industrial wastes were pointed out by speaker Frederick H. Dechant as a practical consideration for the sanitary engineer. Appearing before the annual meeting of the Section, on May 15, Mr. Dechant outlined Pennsylvania's program of sanitation. During the business session Alfred Hedefine succeeded Col. W. B. Shea, who has been secretary for sixteen years of this, the Society's largest, Local Section. Mr. Hedefine is chairman of the Society's Structural Division. The new president, David B. Steinman, was installed. The Robert Ridgway Student Chapter Prizes were conferred upon Ralph N. Cestone, of Rutgers University; Edward Cohen, of Columbia University; Elliot H. Kahn, of the College of the City of New York; Terrance K. McCormack, of Newark College of Engineering; Egil W. Sparby, of the Polytechnic Institute of Brooklyn; Joseph S. Ward, Jr., of Manhattan College; and William J. Widman, of Cooper Union.

MICHIGAN SECTION

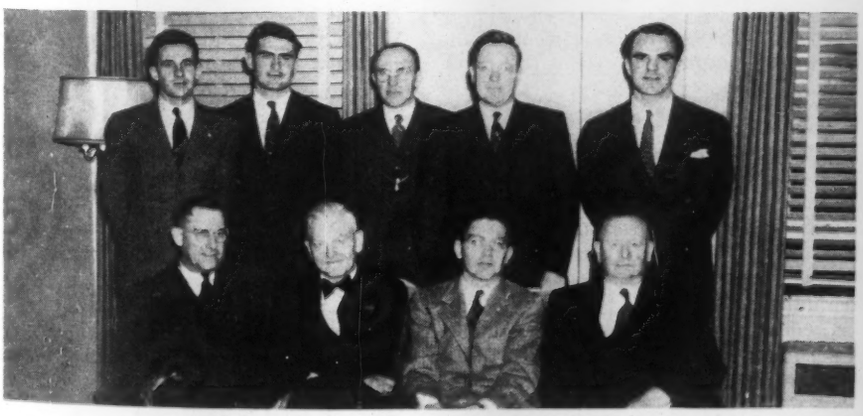
Student Chapter members from all over Michigan attended the April 26 dinner meeting of the Section, which was held at Michigan State College. L. E. Sobkowski, president of the Michigan State College Chapter, welcomed the group to the college and introduced the other Chapter officers. Section President George W. McCordic responded to the welcome and introduced the officers of the Section and the distinguished guests. The joint assemblage then heard Frank R. Theroux, professor of civil engineering at Michigan State College, discuss his experiences as a teacher of engineering in the U.S. Army College at Trirmham, England, during the war.

MOHAWK-HUDSON SECTION

Speaking on "The Role of the Sanitary Corps Around the World," at the April meeting of the Section, Col. W. A. Hardenbergh cited interesting health problems that the Army had to cope with in every country, including the United States. Colonel Hardenbergh, former chief of the Sanitary Corps, stated that malaria was probably the worst problem confronting the Corps. As an example, he pointed out that an Army unit, left unprotected on a malarial beachhead for one night, would develop 20% malaria casualties, and that if the unit were left unprotected for two nights, an additional 10% would develop the disease.

MONTANA SECTION

Members of the Montana Section were recent guests of the Montana State College Student Chapter at a joint meeting held in Bozeman. Guest of honor and principal speaker for the occasion was W. G. Sloan, co-author of the joint Pick-Sloan Plan of the U.S. Corps of Engineers and the Bureau of Reclamation for development of the Missouri River Basin. In his talk Mr. Sloan discussed the plans of the coordinated control, and outlined to his student audience the role that they may be expected to play in the profession. An alumnus of Montana State College, class of 1911, Mr. Sloan is now assistant director of Region 6 of the Bureau of Reclamation.



OFFICERS OF THE MONTANA SECTION AND THE MONTANA STATE COLLEGE CHAPTER

Bottom Row (Left to Right): R. H. Willcomb, Secretary-Treasurer of the Section; W. G. Sloan; Gene Wilde, President of the Chapter; and C. S. Heidel, Section President. Top Row: Howard Schlepp and George Hoffman, Vice-President and Secretary-Treasurer of the Chapter; Contact Member C. D. Bue; David MacAlpine, Section Vice-President; and Faculty Adviser J. P. Michalos

NORTH CAROLINA SECTION

The spring meeting of the North Carolina Section—held in Raleigh on May 3—took the form of an all-day joint session with the North Carolina State College Student Chapter. Following a business session in the morning, John Watson, Greensboro consultant, spoke on "Construction of the Gaseous Diffusion Plant for the Atomic Bomb," and A. W. Foster, Student Chapter member, discussed "New Construction Materials." The joint luncheon, held in the Carolina Hotel that noon, was addressed by C. G. Brennecke, head of the electrical engineering department at North Carolina State College, on the subject of electronics. First on the afternoon technical program was the showing of a motion picture, entitled "Shipways," which was presented by A. B. Scott, North Carolina representative of the Bethlehem Steel Company. Then F. G. Tatnall, manager of research for the Baldwin-Southwark Division of the Baldwin Locomotive Works, read a paper on the SR-4 strain gage; and T. P. Heritage, Student Chapter member, spoke on "Modern Education and the Engineer."

NORTHWESTERN SECTION

Student Chapter members were guests of the Section at the May 6 meeting, which took place at the University of Minnesota. The list of speakers included R. W. Gamble, of Milwaukee, Society Director, who discussed Society affairs at the national level; W. F. Arksey, president of the Junior Forum, who discussed the activities of the Forum; Allen Benzick, president of the University of Minnesota Student Chapter, who described the current program of the Chapter; and L. G. Straub, dean of the department of civil engineering at the University of Minnesota, who spoke on the highly successful cooperation between service organizations and scientists during the war in the development of radar, somar, jet propulsion, and rocket weapons. Dr. Straub's talk was supplemented by a sound-film on rockets. During the evening three students at the University of Minnesota received the Section's annual award of engineering handbooks. The winners are George S. Iwanaga, first prize; Kenneth D. Hoyt, second prize; and Amos C. Sanford, third prize.

MEMBERS OF PUERTO RICO SECTION VIEW SITE OF CAONILLAS DAM

PUERTO RICO SECTION

An inspection trip to the construction site of Caonillas Dam was recently enjoyed by members of the Puerto Rico Section. When completed, the dam will be the largest in the country, rising 260 ft above the stream and impounding 48,000 acre-ft of water. After inspection of the site and discussion of the construction problems involved in the project, luncheon was served the group. Then films, depicting the model tests for the dam and the construction of a similar structure recently built at Des Bocas, were shown.

SACRAMENTO SECTION

A demonstration and symposium on the use of models and perspective drawings in the design of complex bridges was the feature of the April 30th meeting. Participants in the program were Andrew Meehan, Charles R. Poppe, George W. Smith, H. E. Kuphal, and Elrod Bradt, all of the California Bridge Department. They displayed a number of models and drawings prepared by the Department, and explained how they are used in technical engineering studies of proposed bridges in demonstrating and illustrating potential projects for contractors and bidders, and for public relations purposes. Speakers at the other luncheon meetings held during the month were Richard L. Boke, regional director for Region 2 of the U.S. Bureau of Reclamation, and Walter E. Jessup, Western representative of the Society.

ST. LOUIS SECTION

There was one of the largest turnouts in the history of the Section for the April meeting, at which Col. Clark Kittrell, division engineer for the Upper Mississippi Valley Division of the U.S. Engineer Corps spoke on "The Plan for Development of the Mississippi River and Chain of Rocks." This subject is of special interest to St. Louis and adjacent communities because the Chain of Rocks reach, lying at the northern boundary of St. Louis, has become widely known as a serious obstacle to a more complete use of the river. During the war it was frequently necessary to draw water from Fort Peck Dam, the pools of the Mississippi, and even from Lake Michigan in order to float 2,000 vessels for war use over this point. Plans have now been drawn to build a canal and locks on the east side of the river so that navigation in the stretch in question will be possible at all times. It is expected that the work will start in July of this year and will take about three years to complete.

SAN FRANCISCO SECTION

A change of attitude must be developed in the driving public, said Edwin M. Wetmore, director of accident prevention for the Key System (Interurban Railway), in a recent talk before the San Francisco Section. He cited the apparent inability of training programs and engineering "advances" in road-building to reduce the accident rates, and strongly urged the promotion of a safety consciousness in the motorist.

SPOKANE SECTION

The list of guests at a special dinner meeting, held on April 29, included W. D. Shannon, Society Director for District 12; Carl E. Beam, Assistant to the Secretary; and Walter E. Jessup, Western representative of the Society. Both Mr. Beam and Mr. Shannon discussed the forthcoming Spokane Convention and plans for making it an outstanding success. Mr. Shannon also commented on the younger members of the profession, and stated that the Society must find new ways to be of service to this group. Mr. Jessup spoke on collective bargaining and discussed the formation and operation of existing bargaining units for engineers in various parts of the West.

TACOMA SECTION

Atomic fission was discussed by Prof. C. L. Utterback at a recent meeting of the Section. Professor Utterback, who is executive officer of the department of physics at the University of Washington, traced the history of the years of research that went into the ultimate development of the atomic bomb and spoke on the probable future use and development of atomic energy. Nuclear disintegration and atomic fission were described by the use of slides.

TOLEDO SECTION

"Chinese engineers performed good work in all types of wartime construction," G. W. Hibbert, former Army colonel, told a recent meeting of the Toledo Section. While stationed at Kunming as a public relations officer, Mr. Hibbert had an opportunity to observe the construction of more than a thousand miles of roads, including the Ledo–Burma Road, and he had many experiences to relate.

TEXAS SECTION

A round-table discussion of socialized medicine, which constituted the technical program at a recent meeting of the Fort Worth Branch, aroused such interest that the membership decided to have a doctor speak on the subject. Thus Dr. Jack Furman was invited to address a subsequent meeting on the workings of the Wagner-Murray-Dingell Socialized Medicine Bill currently before Congress.

TRI-CITY SECTION

Speaker of the evening at the April meeting of the Tri-City Section, which took place in Davenport, Iowa, was L. C. Crawford, district engineer for the U.S. Geological Survey, at Iowa City, Iowa. In an illustrated talk, entitled "River Flow and Sediment Records," Mr. Crawford discussed present-day methods of collecting stream-flow and silt-load data.

WISCONSIN SECTION

A symposium on highways constituted the technical program at the April meeting in Madison. First, the history of the Wisconsin Highway Commission was outlined by James R. Law, chairman of the Commission, who described the various changes that have come about in obtaining and spending highway funds. "About $60,000,000 is required per year to maintain the 93,000 miles of highway in the state," Mr. Law pointed out. He was followed by Emmons L. Roettiger, chief engineer of the Commission, who stated that in the future additional attention will be given to the foundations of the highways as well as to surface coverage. He

also announced a policy of abandoning the thickened edge section, expansion joints, and dowel bars for all future highways in the state. Studies of traffic origin, flow, and destination and parking problems were then discussed by G. E. Eldred, district engineer for the Public Roads Administration.

WEST VIRGINIA SECTION

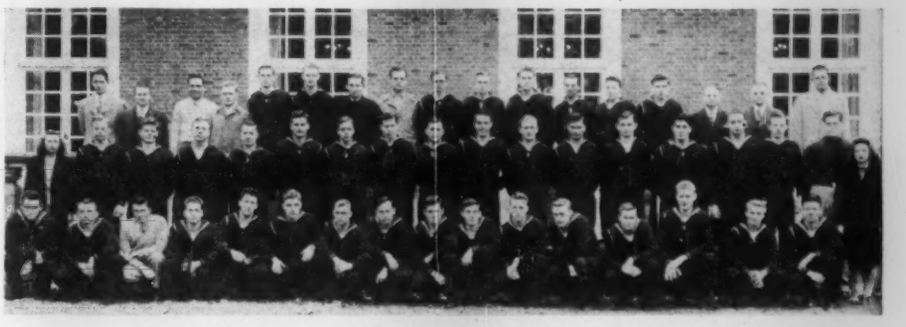
"Construction and Engineering in a Chemical Industry" was the topic of discussion at a recent dinner meeting in Morgantown. This was presented by Ralph N. Shepard, engineer of construction and design for the Carbide and Chemicals Corporation, South Charleston, W.Va., who drew upon his experiences in his own company for his material, illustrating his talk with prepared organization charts. During the evening G. P. Boomsliter, former president of the Section, spoke briefly on "The Society and Collective Bargaining."

Student Chapter Notes

UNIVERSITY OF COLORADO

SOCIETY'S WESTERN REPRESENTATIVE VISITS THE UNIVERSITY OF COLORADO CHAPTER
Front Row (Left to Right): George Knoeber, President of the Chapter; Mr. Warnock; Mr. Ryan; Mr. Jessup; and Warren Raeder, Head of the Civil Engineering Department

A visit from Walter E. Jessup, Western representative of the Society, initiated the University of Colorado Chapter's spring program. Mr. Jessup, who has been speaking before Student Chapter groups in an attempt to familiarize them with the Society and its work, gave a brief résumé of current Society activites, the objectives of the organization, and the advantages of Society membership to young engineering graduates. The attendance of sixty included J. E. Warnock, president of the Colorado Section, and A. J. Ryan, secretary-treasurer of the Section and Contact Member for the Chapter.



MEMBERS OF THE UNIVERSITY OF ILLINOIS STUDENT CHAPTER

UNIVERSITY OF ILLINOIS

The University of Illinois Chapter is again publishing its semimonthly mimeographed bulletin, *Civil Views*, which was discontinued during the war. Recent Chapter activities include a smoker, in April, for the freshmen and other new students. On this occasion five members of the civil engineering faculty had been invited to address the group on various aspects of the engineering work at the university and on the purpose and aims of the Chapter. These were Whitney C. Huntington, head of the civil engineering department; Harold E. Babbitt, professor of civil engineering; William A. Oliver, associate professor of civil engineering; Wilbur M. Wilson, research professor in structural engineeering; and James G. Clark, assistant professor of civil engineering and Faculty Adviser.

UNIVERSITY OF UTAH

The University of Utah Student Chapter reports an interesting and active spring program. The Chapter arranged an interesting display for the annual Engineering Week held on the campus, and sponsored several meetings. On one occasion, Mr. Long, representative of the Portland Cement Association in Utah, lectured on the subject of soil-cement, giving unusual facts and figures on the economics of the product. An accompanying film demonstrated the actual use of soil-cement in the construction of air bases throughout the country, pointing out the rapidity of construction permitted by this method that made it especially valuable during the war. At another meeting J. J. Sedall, of the H. H. Robertson Steel Company, presented an illustrated lecture on "Light-Gage Steel Floors." The recent election of Chapter officers resulted as follows: Fred Hammill, president; John Maragakis, vice-president; Vervin Gilson, secretary; and Bud Madsen, program chairman.

BADGES AND CHARMS for Student Chapter members are again available at a cost of $1 each. These may be obtained from Society Headquarters or through the Student Chapter officers.

MEMBERS OF THE UNIVERSITY OF UTAH STUDENT CHAPTER

ITEMS OF INTEREST

About Engineers and Engineering

Clean-up of Pennsylvania's Streams Ordered

By H. E. MOSES, M. ASCE
CHIEF ENGINEER, PENNSYLVANIA DEPARTMENT OF HEALTH, HARRISBURG, PA.

NOTICES requiring preparation of plans for facilities to eliminate stream pollution have been sent to 482 municipalities and institutions in Pennsylvania by the State Sanitary Water Board. An additional 319 notices have been sent to industries discharging harmful wastes into state waters. All these notices direct that completed plans be submitted to the Board for approval within one year. Quarterly reports of progress on the plans are required, and the degree of treatment is specified in each case. Additional notices will follow until all known polluters have been included.

Not included in the preceding totals are notices issued to anthracite coal operators requiring them to adopt methods to prevent the discharge into state waters of coal-mine silt. The exemption for this waste, contained in the 1905 and 1937 laws, was removed by the Sanitary Water Board on May 17, 1944, that is, before the 1945 session of the General Assembly, at which time the exemption was deleted by statute. This work is progressing satisfactorily, and 152 applications for approval of plans for silt removal from anthracite wash waste water have been received. They cover all but three of the anthracite coal breakers using the wet method of coal preparation. As a matter of fact, a number of treatment works have already been constructed and a large volume of silt which under former conditions would have reached the streams is now being reclaimed. Delay in building other similar works has been occasioned by difficulties in securing labor and materials.

Although acid mine drainage is still exempted in general from the provisions of the anti-stream-pollution laws, yet the Brunner Bill enacted in 1945 nullified the exemption as regards clean streams, making unlawful such discharge into "clean waters" of the Commonwealth which are being devoted or put to public use at the time of such discharge, or into other clean waters, unless the Commonwealth fails or neglects to provide drainage systems to receive such acid mine drainage and to divert it to a point or points of discharge into streams already contaminated. In furtherance of this phase of the stream-pollution problem, mine operators are required to file plans of their drainage systems, and as an indication of the size of this job, notices have been sent to 2,540 operators of bituminous coal operations, and thus far 1,520 mine-drainage reports have been received. These replies represent approximately 68% of the bituminous operators listed.

In an effort to save the clean streams of the Commonwealth, it was deemed in the public interest for the state to provide funds for building drainage systems through which the acid mine water would be diverted to streams already contaminated. To this end, the Sanitary Water Board may acquire land, easements or rights of way over, under, or through lands to be used for the transportation and diversion of the discharge of acid mine drainage into waters already polluted. In addition, the Commonwealth will pay the cost of construction, maintenance, and operation of such drainage systems. The acid mine drainage must be delivered by the operators to a point or points designated by the Sanitary Water Board after consultation between the mine operator, the Department of Mines, and the Sanitary Water Board. Funds have been appropriated for this purpose.

In order to implement this program, the sum of $6,625,000 has been allotted for these activities: $4,250,000 for state aid; $500,000 for mine sealing; $1,700,000 for acid mine-water diversion and silt control; and $175,000 for research. The money for state aid is an outright grant to municipalities, municipal authorities, or private corporations. Financial aid for the preparation of plans for treatment works may be given to municipalities and municipal authorities in a sum not to exceed 50% of the actual cost of detailed construction plans and specifications as approved by the Sanitary Water Board.

State aid in the preparation of plans and specifications for privately owned industrial-waste treatment works will be granted only in cases of industrial wastes for which, in the opinion of the Board, there are as yet no known satisfactory means of treatment; or where the granting of public funds for additional experimentation is warranted by the public benefits that may result.

Information in this item was presented by Mr. Moses to the Sanitary Engineering Division at its recent session in Philadelphia.

Third Hydraulics Conference at Iowa Institute June 10–12

PEACETIME utilization of wartime experience will be the general theme of the Third Hydraulics Conference of the Iowa Institute of Hydraulic Research to open on Monday, June 10, and continue through Wednesday, June 12. In the four years that have elapsed since the Iowa Institute held the second of its series of hydraulics conferences, the urgency of war requirements has resulted in a rapid development of practically every phase of engineering. Therefore the Institute has advisedly chosen as the theme of its Third Conference the application of such wartime experience to peaceful phases of hydraulic engineering. Papers of this nature will represent about half of the conference program; the other half will deal largely with current subjects in closely related fields. There will be opportunity for informal discussions during both the scheduled sessions and the evening gatherings.

Ladies will be welcome at luncheons and dinners, and arrangements will be made for their entertainment during the technical sessions. Registration will begin Sunday afternoon, June 9, in the lobby of the Iowa Memorial Union, Iowa City, Iowa. Reservations may be made through Prof. J. W. Howe, Engineering Building, University of Iowa, Iowa City.

How One Group of Engineers Avoided a National Union

Of value to engineers threatened with inclusion in heterogeneous collective bargaining groups is a step-by-step description of action successfully taken by other engineers in a similar situation. Organization of this New Jersey group was reported in the May issue of "Mining and Metallurgy," published by the American Institute of Mining and Metallurgical Engineers, and is reprinted with permission.

ONE morning during the summer of 1944, the engineers at the Camden plant of the Radio Corporation of America were given handbills as they were about to enter the buildings to report for work. These notices informed them that a new union of salaried technical employees had been formed by the Federation of Architects, Engineers, Chemists, and Technicians (FAECT), a CIO affiliate, and that the engineers were included. This news came as a surprise to most of the engineers since they had not been asked to join and did not realize they would be included in such a heterogeneous group, which included such jobs as draftsmen, photographers, process men, job analysts, and technical writers.

At first the engineers were either unaware of or indifferent to their impending position, but it soon became evident that unless prompt action was taken they would be represented by a national labor union in all matters of negotiation with the Company. It was also apparent that once the union was recognized as the bargaining agent it would be extremely difficult and costly for the professional engineers to extricate themselves as a group to form an independent organization.

Accordingly, a "Committee for Professional Personnel" was formed for the primary purpose of ascertaining the aims and viewpoints of the engineers involved and, if desirable, to obtain a separate election for the engineers to decide whether they wished to be represented by the FAECT. This Committee petitioned the National Labor Relations Board for a hearing. This was granted, and it was shown that the engineers as a group performed a distinctive type of work requiring specialized training and qualifications and as such their interests dif-

fered widely from those represented by the FAECT. The final outcome was that the NLRB issued a "Decision and Direction of Elections" in which the engineering group was granted a separate election. Within a month the election was held and the engineers rejected the FAECT as a bargaining agency.

The results of the election posed another major issue for the engineers, namely, what course to take next. The formation of a technical-social organization would not receive NLRB support and the path would still be open for some other organization to seek certification as the sole bargaining agent. The question arose, "Is collective bargaining desirable for the engineers?" Current trends are gradually forcing engineers into a defensive position, so it would seem obvious that an independent collective bargaining agency would be best equipped in understanding and common interests to serve their own problems.

The Committee for Professional Personnel, reinforced with the opinions of the engineers, gave considerable study to the above issues and its final recommendation was that the engineers form an independent organization to seek collective bargaining rights. The Committee set up membership and constitution subcommittes in preparation for the organization. A majority of the engineers soon expressed a desire to become members, a constitution was written and adopted by a referendum vote, and the Association of Professional Engineering Personnel came into being. Councilmen were elected by the membership, and at a subsequent meeting the Councilmen officially elected permanent officers.

A petition was sent to the National Labor Relations Board and the Company for recognition of the Association as the sole collective bargaining agent for the research, design, and development engineers and engineering students at the Camden plant. The NLRB called a hearing for RCA, APEP, and FAECT on January 6, 1945. The latter did not appear, and as a result of this meeting the Company and the Association signed a joint stipulation to accept the results of a cross check of the Association membership cards against the Company payroll list of December 31, 1944. The Company sent the list to the NLRB and the Board conducted a check on January 15. The results indicated that 201 of the 298 employees in the group involved designated the Association as their representative for purposes of collective bargaining. Accordingly, the regional office of the NLRB recommended to the NLRB in Washington that the APEP be certified.

On January 25, 1945, the Association was formally certified by the NLRB as the sole bargaining agent for all the research, design, and development engineers and engineering students at the Camden plant of the RCA Victor division of the Radio Corporation of America.

Contract negotiations started in March and continued for nearly one year. The final contract was signed in February 1946. Since this Association is the only one of its kind in the industrial East, and since there was little precedent for such a contract, a great deal of hard work was required. Since the negotiating committee did not have a national organization to satisfy, it was not necessary to ask for a closed shop, maintenance of membership, dues checkoff, or any of the other contract provisions which have the primary purpose of perpetuating the national officers of a union at the expense of the members.

The final contract grants substantial benefits to the members. A general raise of $30 per month or 10%, whichever is greater, was granted, retroactive to August 1945, and a merit system of raises was established. Time and one-half is paid for overtime up to a base rate of $5,000 per year, and a sliding scale for rates between $5,000 and $6,000 per year. Seniority is based on skill and ability as well as length of service, in accord with a point system. Credit is given for time spent in training in a duly accredited educational institution as well as engineering experience in other companies. The grievance procedure has arbitration by an outside party as the final step. Several other benefits were granted covering patents, vacations, sick leave, etc. The Association and the Company are enjoying harmonious and cooperative relations and the membership can look to the future with the comforting knowledge that they can run their own affairs, free from dictation by a national labor union.

MURLAN S. CORRINGTON
First President of APEP

Haddonfield, N.J.
April 16, 1946

N. G. Neare's Column

Conducted by

R. ROBINSON ROWE, M. ASCE

"I'VE BEEN expecting," said Ken Bridgewater, "that the atomic bomb, with its gargantuan numbers, would inspire puzzle nuts to new extremes of worthless work. Got one brewing, Noah?"

"Not yet, Ken. Nuclear energy is an example of a rapidly diverging series, which, according to my old-fashioned ideas, is a mathematical outcast. I do have one on real estate which I must use while inflation is still convergent, but you can't hear it until we've disposed of the April problem in integers. Given a triangle ADE with $DE = 35$ and right angle at D, locate B and C on AD so that $BD(AE + CE) = BE(AD + CD)$."

"I had the right answer last month," exclaimed Joe Kerr, "so I'm resting on my laurels."

"Joe's just lazy," booed Cal Klater. "This one was easy. A, B, and C are vertices of 3 right triangles on a 35-ft base, so we need 3 solutions of $35^2 = a^2 - b^2 = (a + b)(a - b)$. For $a - b$ we are limited to the 4 minor factors of 1,225, which are 1, 5, 7 and 25. For each, $a + b$ is the corresponding major factor—1,225, 245, 175 and 49. From these four sets, we can find that $35^2 = 613^2 - 612^2 = 125^2 - 120^2 = 91^2 - 84^2 = 37^2 - 12^2$. There are four ways that we can leave out one set and have the required 3 solutions. Trying each in turn, I found just one that satisfied, viz.: $120(613 + 37) = 125(612 + 12)$. So $AD = 612$, $BD = 120$ and $CD = 12$."

"Just as Professor Stoop Nagle prophesied," agreed Professor Neare. "Your rejected set could be used if we allowed negative solutions, such as $AD = 612$, $BD = 84$, $CD = -12$, but the dynamical balance won't work that way. You may also be interested in a set of generators from which all of the infinitude of integer sets may be derived. Let g, h, j and k be any 4 integers, except that $g > h$ and $j > k$. Then the ruling dimensions of a figure are:

$$DE = 2jk(g^2 - h^2)$$
$$BD = 4ghjk$$
$$AD, CD = 2gh(j^2 + k^2) \pm (g^2 + h^2)(j^2 - k^2)$$

The generators 4, 3, 5 and 1 give the positive solution and 3, 2, 7 and 1 the negative.

"Now for the real estate problem before ceilings go off of houses. Adam Goodby, a realtor, asked for a listing from a man who had a 19-ft car in a half-cube garage on a square base beside a similar house twice as high, both on a square lot of more than a quarter and less than a half acre. The owner appraised his land at 50 cents per sq ft, his house at 20 cents per cu ft and his garage at 10 cents per cu ft. All dimensions being integers, he figured the total listing price, which Adam said was not only fair, but square. How large was the lot?"

Cal Klaters this month were Richard Jenney and a pair from Chicago that worked in cahoots and signed themselves "Wonmug" and "Nothermug."]

Shasta Dam Memorialized

IT IS true of Shasta Dam, as of every other notable job, that it deserves a fitting printed record. This has been amply provided in a book entitled *Shasta Dam and Its Builders*, published by Pacific Constructors, Inc.

It is evident that the builders are proud of their work. Quiet confidence and satisfaction pervade this story through its almost 200 pages. Historical features, personal glimpses, and construction activities are treated. All are profusely illustrated. The sum total is a record book which does justice to a magnificent engineering success.

On file in the Society's Reading Room, this volume will be found of interest to the average engineer as well as to the construction specialist.

Erosion Forces Construction of New Inspection Tunnel at Niagara Falls

INSPECTION of Niagara Falls from the Canadian shore is facilitated by a new access tunnel that has been recently completed through the rock cliff. The new galleries are approximately 120 ft below the surface of the ground and take the place of the old bore, which was dangerously close to the face of the cliff, where it is being worn away by the full force of the falls.

The new construction retains the portals from which spectacular views of the cataract are possible. Well known by many visitors is the Great Falls portal, which is located well under the Horseshoe Falls and past which drops a tremendous volume of water. The new access gallery to these old

portals is located a considerable distance back from the encroaching cliff.

The tunnels have a clear width of 7 ft and a maximum height of 7 ft with an 8-in. minimum lining of concrete all around. Air and water for tunneling and concrete for lining were delivered to the tunnel through a 12-in. bore hole through the solid rock cover. Concrete was shot into wooden forms by a pneumatic placer. Design and construction were under the supervision of the H. G. Acres Company of Niagara Falls, Canada. H. E. Barnett was Construction Engineer on the job.

Third New England Traffic Conference

AN ESTIMATED 300 city and state traffic and highway engineers, planners, public transit executives and others will attend the Third New England Traffic Engineering Conference, June 11–13, at the Massachusetts Institute of Technology.

The conference will tackle the problems caused by the rapidly rising toll of deaths due to traffic accidents and the increasingly difficult traffic congestion situation. The latter problem, as it concerns Boston, will be dealt with at great length on the third day of the conference, and recommendations will be formulated.

The conference is being sponsored by M.I.T.'s Civil Engineering Department and the Massachusetts Department of Public Works, assisted by the Traffic and Transportation Division of the National Conservation Bureau, and the accident prevention division of the Association of Casualty and Surety Executives. Plans for the conference are being handled by John B. Wilbur, M. ASCE, Acting Head, Civil Engineering Department, M.I.T.; Charles B. Breed, M. ASCE, Professor of Civil Engineering, M.I.T.; Edgar F. Copell, Traffic Engineer, Massachusetts Department of Public Works; A. J. Bone, Assoc. M. ASCE, Associate Professor of Highway Engineering, M.I.T.; and Henry K. Evans, Jun. ASCE, Traffic Engineer, National Conservation Bureau.

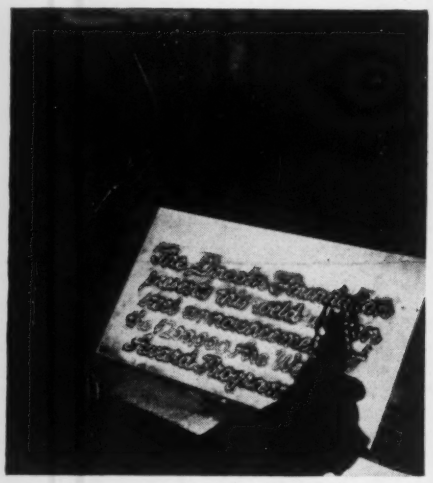
Flood Control Work Resumed in the Southwest

TEMPORARILY suspended by the war emergency, flood control projects of the Corps of Engineers in the Southwest are again under construction. Stripping and excavation at the Canton Dam project on the North Canadian River above Oklahoma City, Okla., marked the resumption of the work. Four projects in Oklahoma, two in Arkansas, one in Colorado, one in Kansas, one in Missouri, and two in Texas—a total of 11 water-control construction projects—are under way, or will begin shortly. More than two years will be required to complete the work contracted for thus far.

All projects are undertaken by the Southwestern Division of the Corps of Engineers. In addition to the Canton Dam they include: Wister Dam and Reservoir on the Poteau River near the Oklahoma–Arkansas state boundary; Fort Gibson Dam and Reservoir on the Grand (Neosho) River near Muskogee, Okla.; Hulah Dam and Reservoir on the Caney River near the Oklahoma–Kansas state boundary; completion of the existing John Martin Dam and Reservoir on the Arkansas River near Las Animas, Colo., by installing spillway gates; Blue Mountain Dam and Reservoir on the Petit Jean River west of Little Rock, Ark., the Bull Shoals Dam and Reservoir on the White River near the Arkansas–Missouri state boundary; Clearwater Dam and Reservoir on the Black River in southeast Missouri; Fall River Dam and Reservoir on a major tributary of the Verdigris River in Kansas; Addicks Dam on Buffalo Bayou in Texas; and completion of riprap protection on the existing Denison Dam near Denison, Tex.

$200,000 Award Program of Lincoln Foundation

AN EXCEPTIONAL opportunity for those engaged in the design, manufacture, or construction of steel structures such as commercial buildings and bridges, or houses, barns, and miscellaneous structures is offered by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, with the announcement of its new $200,000 "Design-for-Progress" Award Program.



ANNOUNCEMENT OF NEW AWARD PROGRAM WRITTEN ON STAINLESS STEEL LETTERHEAD

Two of the 15 classifications, "Structural—Buildings or Bridges," and "Structural—Houses and Miscellaneous," are divided into two divisions. The two divisions of the first of these classifications are (1) Commercial Buildings and Similar Structures, and (2) Bridges. The classification "Structural—Houses and Miscellaneous" is divided into (1) Domestic Shelters, Houses, Barns, etc., and (2) Miscellaneous Structures, Abutments, Caissons, Dams, Tunnels, etc.

In making the announcement, Dr. E. E. Dreese, chairman of the Foundation's Board of Trustees, had his words put down on a stainless steel plate similar to that shown in the accompanying photograph, and sent to prominent engineers and scientists. The penman was an experienced arc welder, who used molten metal for the ink and the welding arc for the pen.

The $200,000 "Design-for-Progress" Award Program, which is intended to encourage study and preparation of papers on design, research and education, application and use of arc welding, is dedicated to the belief that it will benefit industry as a whole. For this purpose, the sponsors will make the results of the program available generally and thus tend to stimulate industry to greater achievement.

Complete details of the award program, which closes June 1, 1947, may be obtained by writing to the Secretary, The James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio.

New in Education

S.P.E.E. to Confer Award for Teaching Excellence

THIS YEAR, for the first time, an award of $1,000 will be given to the college or university teacher adjudged to have contributed most to the successful teaching of engineering students, the Society for the Promotion of Engineering Education has announced. The prize, to be conferred annually, will be known as the George Westinghouse Award in Engineering Education. Established to commemorate the 100th Anniversary of the birth of the famed inventor, the award has been made possible by the Westinghouse Educational Foundation. While there are no age limitations, consideration will be given especially to the younger men.

According to Dr. Harry S. Rogers, M. ASCE, President of the S.P.E.E. and of the Polytechnic Institute of Brooklyn, "The task of the committee on award will involve pioneering in methods of appraising outstanding teaching. The committee already has planned its procedures with great care and the hope is high for a valid appraisal of distinguished contributions and for success in the encouragement of teaching achievement."

Nomination forms will be distributed to the deans of the 165 engineering schools of the country and to the officers and executives of the committees of the S.P.E.E. and related national engineering societies.

* * * *

Wisconsin Offers Correspondence Courses in Mechanics

HOW CAN dynamics and statics be applied in the solution of engineering problems? To answer this question is one of the aims of the two revised correspondence-study courses in mechanics for engineers being offered by the Extension Division of the University of Wisconsin, at Madison, Wis., through its department of civil and structural engineering.

These two courses, Mechanics 1*a* (statics) and Mechanics 2 (dynamics), are mainly for qualified students not currently attending schools of engineering. Each course embodies 24 assignments and allows three credits toward a degree in any branch of engineering. These credits are accepted by most institutions of higher learning.

Original Woodcut by Lynd Ward

When this tree was a sapling, more than a century ago, foundrymen cast gray iron into pipe which is still in service. Their methods were primitive compared with the highly developed production techniques by which U. S. Pipe is made today. And yet, because of the service records of their product, the estimated useful life of cast iron pipe has been steadily revised upward. Cast iron pipe combines in one material all the qualities required for long-lived service—strength, toughness and inherent high resistance to corrosion.

U.S. cast iron PIPE

U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

Twenty-Two Graduate Fellowships Set Up by Standard Oil (Indiana)

ESTABLISHMENT of 22 graduate fellowships at 17 educational institutions by Standard Oil Company (Indiana) has been announced by Dr. Robert E. Wilson, chairman of the board, who said the purpose is "to provide 'seed corn' for future research."

Fellowships in civil engineering have been established at Purdue; in engineering at Michigan, Minnesota, Iowa, Illinois, Purdue, and Illinois Institute of Technology; in chemistry at Northwestern, Illinois, Chicago, Wayne, Ohio State, Wisconsin, Iowa State, and Johns Hopkins; in chemical engineering at Massachusetts Institute of Technology, Minnesota, Illinois, Cornell, Carnegie Tech., and Princeton; and in marketing and management at Northwestern.

The fellowships will be awarded to students working for master's or doctor's degrees. They will vary somewhat in amount, depending on the tuition and other fees, but will average about $1,500 a year. The work will be basic research, and the results will be published in accordance with the usual academic practice. Holders of fellowships will be under no obligation to Standard Oil as regards subsequent employment, nor will the sponsoring company receive any rights to patents resulting from the work.

NEWS OF ENGINEERS

Personal Items About Society Members

HENRY F. BOYER has accepted a position in the design engineering department of the Raymond Concrete Pile Company, with headquarters in New York City. He was recently separated from the Corps of Engineers, U.S. Army, in which he held the rank of captain. Prior to entering the service, Mr. Boyer was in the Pittsburgh district office of the U.S. Engineer Office.

CHESTER S. ALLEN has been elected president of Lockwood Greene Engineers, Inc., succeeding the late ALBERT L. SCOTT. Mr. Allen was formerly vice-president.

JOHN F. LABOON, director of the Allegheny County (Pennsylvania) Department of Public Works, has just been made chairman of the newly created Allegheny County Sanitary Authority, which will plan and maintain a coordinated scheme of sewage disposal and treatment works for the 126 municipalities in the county, including the city of Pittsburgh.

JACOB WEGWEISER, formerly with the Mason and Hanger Company, Inc., of New York, is now with the Underpinning and Foundation Company, of the same city. He was recently released from duty as a lieutenant in the Civil Engineer Corps of the U.S. Navy.

FORREST E. BYRNS, after almost five years active service in the Civil Engineer Corps of the U.S. Navy, has returned to Washington, D.C., to accept a position as liaison specialist with the U.S. Bureau of Reclamation. His rank at the time of separation from the service was that of commander.

THOMAS R. ARCHIBALD is now in the engineering department of the Board of Education at Rochester, N.Y. Until lately Mr. Archibald was in the Corps of Engineers, U.S. Army, having the rank of colonel at the time of his discharge.

DIRK A. DEDEL has been made progress control officer for Region 3 of the U.S. Bureau of Reclamation, with headquarters at Boulder City, Nev. He was previously in the Denver office of the Bureau.

ROBERT B. RHODE was recently promoted to the position of division engineer of the Northern Pacific Railway, with headquarters at Missoula, Mont.

N. P. TURNER is now a member of the Fort Worth (Tex.) consulting firm of Freese and Nichols, the firm name becoming Freese, Nichols, and Turner. Mr. Turner will represent the organization in Houston, having his office in the United Gas Building.

S. S. STEINBERG, dean of the college of engineering at the University of Maryland, has been elected an honorary member of the Argentine Society of Engineers in Buenos Aires "in recognition of his professional attainments and his outstanding work in promoting closer relations among the members of the engineering profession in the three Americas."

AUBREY BLAN BELL, after several years' service in the Sanitary Corps of the U.S. Army, has established a business for himself, to be known as the Bell Reproduction Company. He will be located at 622A Throckmorton Street, Fort Worth, Tex.

WARREN S. BELLOWS, of the Bellows Construction Company, of Houston, Tex., was elected president of the Associated General Contractors of America at their recent convention held in Chicago.

KIRBY SMITH, who has just retired from the Civil Engineer Corps of the U.S. Naval Reserve, in which he held the rank of rear admiral, has been appointed general deputy expediter for the Veterans Emergency Housing Program. Admiral Smith was largely responsible for developing and supervising a $4^1/_2$-billion-dollar building program for the Navy in the United States, Hawaii, the Canal Zone, and other strategic outposts.

PAUL P. WIANT, following his release from active service as a captain in the U.S. Marine Corps, will be architect and engineer for the Methodist Church in China, with headquarters at 169 Yuen Ming Yuen Road, Shanghai. Prior to entering the Armed Services, Mr. Wiant was director of the Union Architectural Service at Foochow, China.

THOMAS G. HARTON is severing his connection with the Tennessee Valley Authority in order to accept a position with the U.S. Bureau of Reclamation in Washington, D.C. Until lately Mr. Harton was a major in the Corps of Engineers, U.S. Army.

E. MONTFORD FUCIK, who has been serving as a lieutenant in the Civil Engineer Corps of the U.S. Naval Reserve, has been made a member of the firm of the Harza Engineering Company, Chicago, Ill.

ROBERT W. BURKE is one of five newly appointed district sales representatives for Le Tourneau Company. He will serve upstate New York and Canada, with headquarters in Syracuse, N.Y.

JOHN M. HAYES has resigned as associate structural engineer for the Tennessee Valley Authority at Knoxville, Tenn., in order to become district bridge engineer for the Public Roads Administration at Little Rock, Ark.

WERNER AMMANN, who was recently released from active duty in the Civil Engineer Corps of the U.S. Naval Reserve, with the rank of commander, is now with his father, O. H. AMMANN, consulting engineer, 111 Eighth Avenue, New York, N.Y.

WALTER G. WILL is retiring as a commander in the U.S. Coast Guard after nearly thirty-six years in the government services—since 1912 in the Lighthouse Service. In 1935 he was appointed Superintendent of Lighthouses at St. Louis, Mo., holding that position until the Lighthouse Service was consolidated with the Coast Guard in 1939. He has been in Cleveland, Ohio, since 1940, and will continue to make his home at 3356 Ormond Road, Cleveland Heights.

HUBERT E. JENNINGS, until lately a lieutenant commander in the U.S. Navy, aboard the *U.S.S. Mississippi*, has accepted a position with the North Carolina State Highway Department.

JOSEPH C. NOWELL, JR., who recently returned to the Tennessee Valley Authority as project design engineer after serving as a commander in the U.S. Navy, is leaving that organization to go with the General Electric Company.

L. C. URQUHART, colonel, Corps of Engineers, U.S. Army, for the past five years chief of the Engineering Division in the Office of the Chief of Engineers, is assuming similar duties in the office of the District Engineer, Honolulu, T.H. Prior to 1941, Colonel Urquhart was for over twenty years professor of structural engineering at Cornell University.

W. W. GWATHMEY, JR., has been promoted from the position of district engineer for the Baltimore and Ohio Railroad to that of engineer of construction, with headquarters in Baltimore, Md. He succeeds RICHARD MATHER, who is retiring after many years of service. JOSEPH WILLIAM JONES, former senior assistant engineer, will fill Mr. Gwathmey's position as district engineer.

LEONARD B. GALLAGHER, colonel, Corps of Engineers, U.S. Army, has been appointed district engineer for the U.S. Engineer Office at New Orleans, La. He was previously district engineer at Boston, Mass.

JOHN W. OEHMANN is retiring as inspector of buildings and director of inspection for the District of Columbia after twenty-two years of service in order to establish a consulting practice in Washington, D.C. He will specialize in the design, supervision, and inspection of buildings during construction and in building code practice.

LELAND H. HEWITT, colonel, Corps of Engineers, U.S. Army, has been appointed resident member of the Beach Erosion Board in Washington, D.C. Other ap-

Why You Need B-G Finishers For Large-Area Surfacing

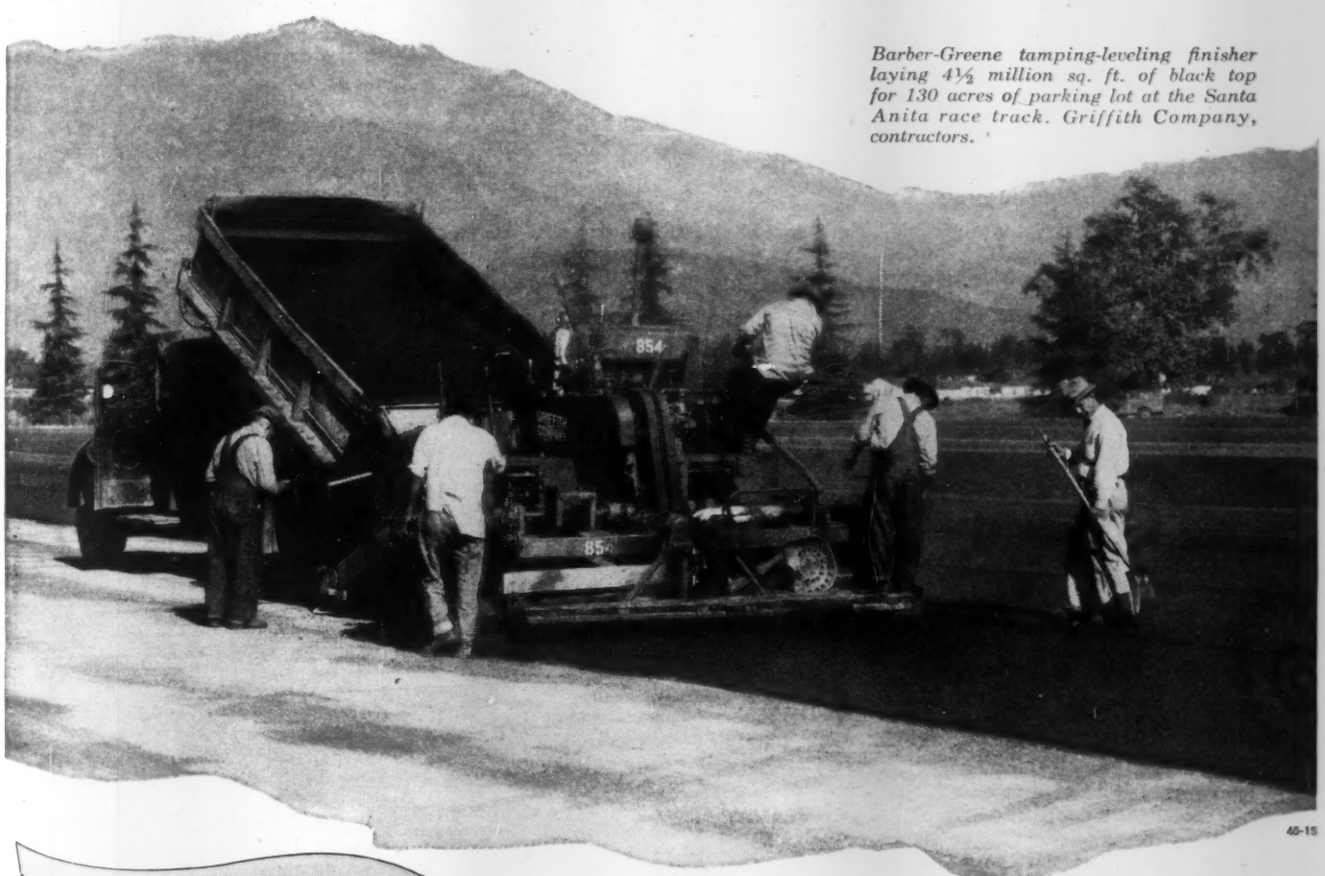
• An important requirement for large area surfacing—such as airport runways, super highways, parking lots, playgrounds, etc.—is that there be *no ridges or breaks in the entire surface area.* With so many of these jobs coming up now and in the near future, B-G Finishers are even more important to you.

These Tamping-Leveling finishers match the joints evenly—they compact and tamp each succeeding strip firmly in place against the previous one.

Because of this even compaction across the full width of the mat (including the joint) you get a ridge-free continuous surface area. There is the same density across the joint that there is in the rest of the strip.

The B-G Tamping-Leveler finisher will lay any mix, hot or cold, loosely graded or sheet asphalt—and up to 6 inches thick. Also, it gives you a mat of uniform density and a smooth level surface over an irregular sub-base.

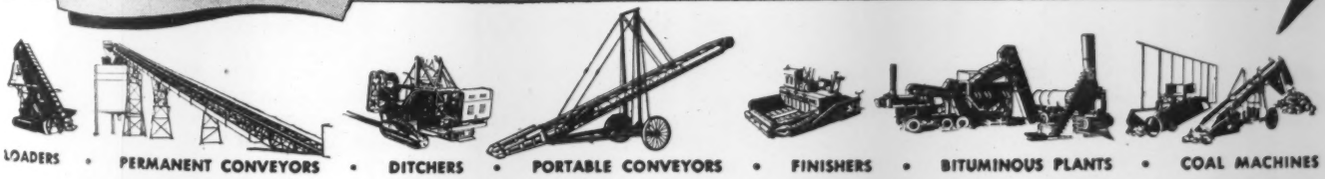
Your Barber-Greene representative has catalogs on Barber-Greene asphalt equipment and data on its performance on jobs like yours. Barber-Greene Company, Aurora, Illinois.



Barber-Greene tamping-leveling finisher laying 4½ million sq. ft. of black top for 130 acres of parking lot at the Santa Anita race track. Griffith Company, contractors.

40-15

B-G Barber-Greene CONSTANT FLOW EQUIPMENT



LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

pointments to the Board include COL. CHARLES L. HALL, division engineer for the North Atlantic Engineer Office.

NEWLIN D. MORGAN, JR., has returned to his duties as assistant professor of civil engineering at Rutgers University after serving as a major in the Corps of Engineers, U.S. Army.

H. A. HOLMSTROM is now on terminal leave after five years in the Air Corps and Military Government, his most recent rank being that of colonel. He has accepted a position as resident engineer for the Texas State Highway Department at Fort Davis, Tex.

PERCY Z. MICHENER, who was recently released from the Corps of Engineers, U.S. Army, in which he had the rank of colonel, has become connected with the St. Louis (Mo.) consulting firm of Sverdrup and Parcel.

GEORGE R. CARTER has established a civil engineering practice at Du Quoin, Ill. During the war he served as a lieutenant in the Civil Engineer Corps of the U.S. Naval Reserve.

MAX BOOKMAN is now district engineer of the Riverside County (Calif.) Flood Control and Water Conservation District.

ARTHUR E. W. DODDS, formerly chief engineer for the Weyerhaeuser Sales Company at Tacoma, Wash., has joined the staff of Young and Richardson, an architectural and engineering firm in Seattle, Wash.

FRANK M. WILLIAMSON, captain, Sanitary Corps, U.S. Army, recently returned from service with the U.S. Military Government in Korea and has resumed his former position as assistant civil engineer, Sewage Treatment Plant Design, Sanitary District of Chicago, Chicago, Ill.

DECEASED

BERTON ARTHUR BARRETT (Assoc. M. '34) major, Corps of Engineers, U.S. Army, died in Zeutsingi Prison Camp, Japan. The exact date of his death is unknown. Major Barret was 40, and a graduate of Norwich University. From 1927 to 1932 he was draftsman and designer for the Port of New York Authority, and from 1933 to 1935, associate professor of civil engineering at Chiao-Tung University. Later he was with various private firms in China and civil engineer for the Atlantic Gulf and Pacific Company in the Philippines. Before his capture on Bataan, he was engineer in charge of constructing the breakwater in Manila Bay, the air base at Cavite, and a large hydroelectric project for the city of Manila.

JAMES EVERETT BESWICK (M. '28) civil engineer for the New York City Board of Water Supply at Kingston, N.Y., died there on April 15, 1946, at the age of 63. From 1907 to 1913 Mr. Beswick was assistant engineer for the New York Board of Water Supply on the construction of the Catskill Aqueduct; from 1915 to 1920, engineer for the New York State Public Service Commission; from 1920 to 1922, engineer for the New York Water Power Investigation; and from 1922 to 1929, resident engineer and sanitary engineer for the village of Rye, N.Y. Later he was on the Water Policy Commission of New Jersey, and since 1936 he had been with the Board of Water Supply on the Delaware Aqueduct Project.

CHARLES FREDERICK BLOOD (Assoc. M. '09) of Ridgefield, N.J., died in a hospital in Englewood, N.J., on April 14, 1946, as the result of injuries received in a fall. In a few days he would have been 63. Early in his career Mr. Blood was with the Baltimore and Ohio Railroad Company, and then was connected with Isaac A. Hopper and Son, of New York City, on various construction projects in Pennsylvania. He was also engineer of the Borough of Ridgefield, N.J., and designer of the sewer system there. More recently he had been engineer in charge of the W.P.A. projects at the Palisades State Park.

HARRY REMINGTON BOUTON (Assoc. M. '13) department engineer for the New York City Board of Water Supply, died in White Plains, N.Y., on April 14, 1946, at the age of 66. Mr. Bouton had spent practically his entire career with the Board of Water Supply, having gone there in 1907. His work during this period included construction of delivery tunnels and conduits in connection with the Catskill system and the construction of conduits in Brooklyn and Queens. From 1936 on he was engaged on the construction of the Delaware Aqueduct—first as department engineer in charge of work on the southern half of the aqueduct, and since 1940 in the New York headquarters in charge of the design of structures and preparation of contracts for the entire Delaware system.

NEIL STANLEY BUCKBEE (M. '19) chief engineer with Gannett, Fleming, Corddry, and Carpenter, Inc., of Harrisburg, Pa., died at New Cumberland, Pa., on April 10, 1946. Mr. Buckbee, who was 62, had been with Gannett, Fleming, Corddry and Carpenter since 1929 and had worked on the development of a mountain water system for Harrisburg as well as on plans for a sewage treatment plant. Firms with which he was connected in his earlier career included the General Fireproofing Company, of Youngstown, Ohio; the Corrugated Bar Company, of Buffalo, N.Y.; and the Schaaf Company, of Buffalo.

JOHN ABELL CLEVELAND (M. '27) of Miami, Fla., died on April 17, 1946, at the age of 70. Mr. Cleveland, a graduate of the U.S. Military Academy at West Point, spent many years on railroad construction in Ecuador. In 1926 he went to Miami, where he became vice-president of the Filer-Cleveland Company. More recently he had been engaged in apartment and hotel management in Miami.

WILLIAM ROBERTS CONARD (Assoc. M. '15) consulting engineer of Burlington, N.J., died at his home there on April 30, 1946. Mr. Conard, who was 76, had for many years maintained a consulting and inspection engineering practice at Burlington. During this period he was a consultant on water supply problems to many eastern cities, including Boston and Springfield, Mass., and Albany, N.Y. He also served as a consulting engineer, during the first World War, on the construction of the camp at Fort Dix, N.J., and the Bethlehem Steel Corporation's shell-loading plant at Mays Landing, N.J. At the time of his death he was chairman of the New Jersey State Water Commission.

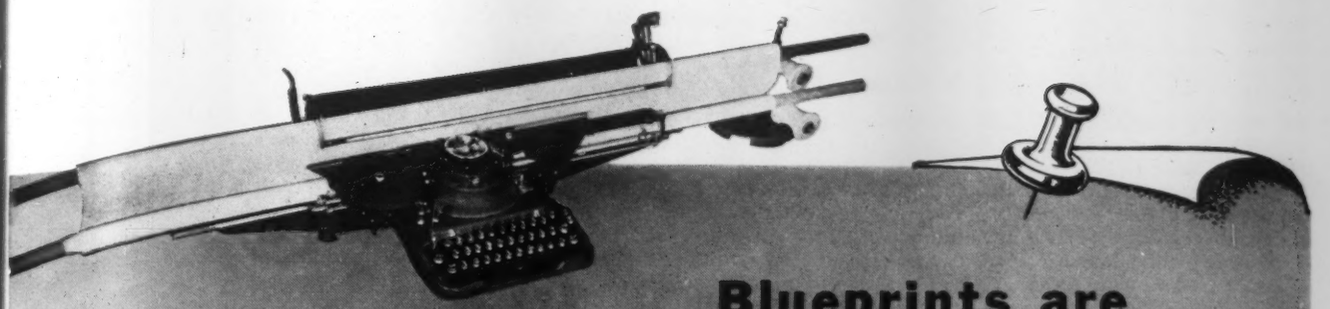
GEORGE WASHINGTON GARDNER (M. '35) consulting sanitary engineer of White Plains, N.Y., died in a hospital there on April 30, 1946. His age was 57. In his earlier career Mr. Gardner was engaged in railway and municipal engineering in New Jersey, and from 1925 to 1931 he was project engineer for the Westchester County Sanitary Sewer Commission. He then became resident engineer for the city of Rome, N.Y., and later practiced engineering in Lowville, N.Y. During the recent war he served as an engineer for the Navy on the installation of sanitation and water-supply systems in Newfoundland.

PAUL HOLLAND (M. '40) chief highway design engineer of the Board of Wayne County (Mich.) Road Commissioners, Detroit, Mich., died on April 14, 1946. Mr. Holland, who was 50, had spent his entire career with the Board, having gone there as chief highway design engineer in 1919. In that capacity he designed the entire system of county roads in Wayne County and, with city and state officials, participated in the engineering and design of the John C. Lodge Expressway and the Detroit Crosstown Expressway. He also designed the out-county sewer and water systems and the present Wayne County Airport and, in the past year, he had prepared designs for the enlargement of the airport. He had also served as consultant on highway matters to the Highway Research Board of the National Research Council.

CONDE BALCOM MCCULLOUGH (M. '28) assistant state highway engineer for the Oregon State Highway Department, Salem, Ore., died suddenly at his home there on May 6, 1946. He was 58. Early in his career Mr. McCullough was with the Iowa State Highway Commission, and from 1916 to 1919 he was professor of civil engineering at Oregon State College. In the latter year he became connected with the Oregon State Highway Department. Since 1935 he had also, at times, been senior bridge engineer for the Public Roads Administration on construction of the Inter-American Highway in Central America, and was about to leave for El Salvador to supervise a bridge project for the Administration when he was stricken.

CHARLES SABIN NICHOLS (M. '21) city engineer of Miami, Fla., died on April 20, 1946, at the age of 62. Mr. Nichols was for some years associate professor of civil engineering at Iowa State College and sanitary engineer at the Iowa Engineering Experiment Station there. He went to Miami in 1925, and had been city engineer since 1927. In the latter capacity he worked unceasingly to provide an adequate sewage-disposal system for the city, and his plans were approved by referendum just before his death.

WALTER PEARL (M. '08) engineering aid in the survey department of the Los Angeles County Flood Control District, Los Angeles, Calif., died on February 11, 1946. His age was 79. From 1886 to 1912 Mr. Pearl was engaged on early irrigation and hydraulic engineering work in Colorado. He then went to California as chief of party for the Los Angeles County Flood Control Survey, and from 1919 to 1932 he was with the



Blueprints are Lettered Faster...Read Easier when lettered with VARI-TYPER*

Here's how the *Vari-Typer Lettering Machine* saves you many man-hours in the drafting room and in the plant: (1) *Vari-Typer* letters blueprints four times faster than they can be lettered by hand, (2) *Vari-Typer* eliminates costly production errors caused by misreading of poor hand lettering.

For lettering on blueprints, black-and-whites, photo-litho and tracing reproductions, *Vari-Typer* is a thoroughly proved method of speeding your drafting room output. One competent typist, operating the *Vari-Typer*, releases four of your draftsmen for full time work in actual design and engineering. Figures and text, lettered with the *Vari-Typer*, are always clear, sharp, uniform and entirely legible. Thus, with *Vari-Typer* you eliminate the possibility of wasted material and time due to misreading of poor hand lettering. *Vari-Typer* will handle a tracing of any size without cutting or folding.

Vari-Typer Lettering Machines are saving thousands of man-hours in scores of plants. Write for complete information on the *Vari-Typer*, or let us give a free demonstration in your own plant on your own work.

THIS IS VARI-TYPER LETTERING

2-IMPERVIOUS SHEATH SHALL BE INSERTED INTO HYSEAL THIMBLE THE FULL LENGTH OF THE SOCKET

RALPH C. COXHEAD CORP.
333 AVENUE OF THE AMERICAS, NEW YORK 14, N. Y.

451

*Reg. U. S. Pat. Off. and Foreign Countries

THIS TEXT COMPOSED ON VARI-TYPER.

Southern California Edison Company in varying positions. Since 1937 he had been with the Los Angeles County Flood Control District.

STEUART PURCELL (M. '24) chairman of the Public Service Commission of Maryland, Baltimore, Md., died on April 18, 1946, at the age of 68. A native of Ireland, Mr. Purcell was educated at Cornell University and spent much of his career in Baltimore. He had been with the Baltimore Water Department; division engineer in charge of maintenance and reconstruction of highways for the city; and chief engineer of Baltimore and president of the Department of Public Improvements. In 1929 he became a member of the Public Service Commission of Maryland, and he was made commissioner in 1939. He had been chairman since 1941.

CLAUDE WELLINGTON SOPP (M. '43) assistant chief engineer and general manager of the Pasadena Water Department, Pasadena, Calif., died in a hospital there on March 31, 1946. Mr. Sopp, who was 51, had been with the Pasadena Water Department since 1922. Earlier in his career he was with the U.S. Forest Service and the U.S. Geological Survey. Mr. Sopp was active in the Los Angeles Section and had recently served a term as vice-president.

WILLIAM MACINTIRE WHITE (M. '09) of Fanwood, N.J., died at his home there on April 25, 1946. Mr. White, who was 73, was a civil engineer with the American Bridge Company for forty-three years—for twenty years in the capacity of contract manager of the New York office. He retired in 1938. Mr. White's work had taken him to Peru to examine bridges for the installation of heavy rolling equipment on the country's railroads, and in 1908 he was sent to China to design railroad bridges.

Changes in Membership Grades

Additions, Transfers, Reinstatements, and Resignations

From April 10 to May 9, 1946, Inclusive

ADDITIONS TO MEMBERSHIP

ADAMS, EDWARD WOLFE (Assoc. M. '46), Prof. Engr. and Contr., 128 North Chama Ave., Albuquerque, N.Mex.

AHRENDT, JAMES DONALD (Jun. '45), Ensign, U.S.N.R., 1528 South East 47th Ave., Portland 15, Ore.

ALEXANDER, STUART MURRAY (Jun. '46), Engr. (Civ.) P-1, U.S. Bureau of Reclamation, Golden Eagle Bldg. (Res., 2540 Fairfax St.), Denver 7, Colo.

BALD, ROBERT EDMUND (Jun. '46), Asst. Engr., Lock Joint Pipe Co., 150 Rutledge Ave. (Res. 65 Ampere Parkway), East Orange, N.J.

BARDIN, ALBERT COLLINS (Jun. '46), Engr., Leeds, Hill and Jewett, 601 West 5th St., Suite 1000, Los Angeles (Res., 1718 Channing Way, Pasadena 3), Calif.

BARRETT, JAMES CANNON (Assoc. M. '46), Emergency Street Impvt. Engr., Eng. Dept., City of Oakland, Room 712, City Hall, Oakland, Calif.

BASCOM, JOHN DWIGHT (Assoc. M. '46), Mech. Engr., U.S. Naval Ordnance-Inyokern, 3170 East Foothill Blvd. (Res., 817 Ladera St.), Pasadena 6, Calif.

BELLOMY, FRANK RAY (Assoc. M. '46), Dist. Civ. Engr. Officer, 3d Naval Dist., U.S. Coast Guard, 42 Broadway, Room 1440, New York, N.Y.

BENDITT, HAROLD WILLARD (Jun. '45), Draftsman, Damon & Foster, Civ. Engrs., Chester Pike & High Sts., Sharon Hill (Res. 247 South 63d St.), Philadelphia 39, Pa.

BLEVINS, RALPH WALLACE (Jun. '46), Eng. Draftsman, City of Chicago, Room 1001A, City Hall (Res., 5726 Winthrop Ave.), Chicago, Ill.

BOSTROM, CONRAD OSCAR (Jun. '45), Ensign U.S.N.R., 58th Naval Constr. Battalion, Care, Fleet Post Office, San Francisco, Calif.

BRIGHT, JOHN HARVEY (Assoc. M. '46), 1305 Poplar Blvd., Jackson, Miss.

BRITAIN, KENNETH EDWARD (Assoc. M. '46), Asst. to Chf. Civ. Engr., The Pure Oil Co., 911 Esperson Bldg. (Res., 2821 Rosedale), Houston 4, Tex.

BUDAGIAN, LEON SUMBATOVITCH (Assoc. M. '46), Prin. Engr., Headquarters U.S. Army, Australia Base Command, G.P.O., Box 1164, Sydney, N.S.W., Australia.

BULGER, ARTHUR JAMES (M. '46), Vice-Pres., Frederic R. Harris, Inc., 27 William St., New York 5, N.Y.

BURGHARDT, KING (M. '46), Highway Bridge Engr., Public Roads Administration, 615 Midland Savings Bldg., Denver 2, Colo.

CAREY, MICHAEL JOSEPH (Jun. '45), Ensign, CEC, U.S.N.R., 2338 University Ave., New York 53, N.Y.

CLYDE, NED PACKARD (Jun. '46), Instr., Civ. Eng., Univ. of California, Room 14, Civ. Eng. Bldg., Univ. of California, Berkeley 4, Calif.

COADY, LOUIS DEPPEN, JR. (Jun. '46), Ensign, U.S.N.; 1609 Beechwood, Louisville 4, Ky.

COLE, REUBEN ECHOLS (M. '46), Lt. Col., Corps of Engrs., 615 North Richmond St., Albuquerque, N. Mex.

COOK, RICHARD WALLACE (M. '46), 2168 Denmark St., Muskegon, Mich.

DANI, PRABHAKAR PURUSHOTTAM (Assoc. M. '46), Res. Engr., Messrs. Duncan Stratton & Co., Ltd., 5 Bank St., Fort Bombay, India.

DIEMER, WILLIAM DAVID (Jun. '46), Draftsman, The Am. Rolling Mill Co., Middletown, Ohio.

FACCHIANO, PETER PASQUALE (Jun. '46), Engr., Designing and Estimating, Bethlehem Steel Co., Room 1145, Fabricated Steel Constr. (Res., R.F.D. 3, Gauff's Hill), Bethlehem, Pa.

FISK, CHARLES CARROLL (Jun. '45), Hydrologic Engr., Hydrology Div., U.S. Bureau of Reclamation (Res., 4585 Vallejo St.), Denver, Colo.

FLETCHER, SAMUEL ARTHUR (Jun. '45), Ensign, CEC, U.S.N.R., 3906 South East Pine St., Portland 15, Oregon.

FLOOR, ERIK (M. '46), (Erik Floor & Associates), 139 North Clark St., Chicago 2, Ill.

FRANCOIS ALVAREZ, EUSTAGQUIO JUAN (Assoc. M. '46), Asst. Public Works Dept. (Res. Avenida Braulio Alvarez No. 68), Ciudad Trujillo, Dominican Republic.

GILLESPIE, ROBERT HUNTER (Jun. '45), Asst. Planning Officer, U.S.N., 1815 Kensington Ave., Youngstown, Ohio.

GLENN, DAVID LEONARD, JR. (Jun. '45), Asst. Civ. Engr., U.S.N., 3812 North Madison, Tacoma, Wash.

GONZALEZ, EUGENIO (Assoc. M. '45), Hydro-Electric Constr. Engr., Empresa Electrica de Guatemala, S.A., Apartado 209, Guatemala, Guatemala.

HARRELL, WESLEY LEE (Assoc. M. '46), Project Engr., Brown & Root, Inc., Drawer 3 (Res., 3311 Ozark St.), Houston 4, Tex.

HARRIS, GUY HINSON (Jun. '46), Draftsman, Compania Agricola de Guatemala, Tiquisate, Guatemala.

HARRISON, DILLARD HOWELL, (Assoc. M. '45), Asst. Regional Engr., Reconstruction Finance Corp., 407 North 8th St. (Res., 5372 Cabanne Ave.), St. Louis 12, Mo.

HART, CHARLES STANLY (Jun. '45), 843 James St., Pelham 65, N.Y.

HOBAN, JOSEPH RICHARD (Jun. '46), Structural Designer, Osborn Eng. Co., East 71st and Euclid Ave., Cleveland (Res., 1392 Webb Road No. 18, Lakewood), Ohio.

HOTCHKISS, JOHN GILBERT (Assoc. M. '46), Structural Design Engr., Sanderson & Porter, 52 William St. (Res., 285 Riverside Drive), New York 25, N.Y.

HOULE, JEROME LAWRENCE, JR. (Jun. '44), Asst. Sewer Designer, Bureau of Sewers, 188 West Randolph St. (Res. 7000 South Stewart Ave.), Chicago, Ill.

HUBBARD, LAWRENCE JEROME (Assoc. M. '46), Asst. Bridge Engr., State Div. of Highways, Box 1499 (Res., 4425 Yon St.), Sacramento 17, Calif.

HUGHES, CHESTER ARTHUR (M. '46), Associate Prof. of Structural Eng., Univ. of Minnesota, 203 Experimental Eng. Bldg., Univ. of Minn., Minneapolis, Minn.

JACOBSON, MARTIN (Jun. '46), Highway Engr. (P-1), Public Roads Administration, Box 1386 (Res. 445 South 2d West), Missoula, Mont.

JOHNSTON, GEORGE BILLY (Jun. '45), Engr., War Dept., U.S. Engr. Office, 1709 Jackson St. (Res., 5923 Jones St.), Omaha, Nebr.

KAISERMAN, JOHN RAITHEL (Assoc. M. '46), Box 6140, Dallas 2, Tex.

KEESE, CHARLES JOSEPH, JR. (Jun. '46), Field Engr., State Highway Dept., Box 324 (Res., 412 College St.), Cleburne, Tex.

KEIM, ROY ELLSWORTH (Assoc. M. '46), Engr., U.S. Bureau of Reclamation, Customhouse (Res., 3078 Bellaire), Denver, Colo.

KILKENNY, PAUL EDWARD (Jun. '46) Structural Civ. Engr., Austin Co., 618 Grand Ave., Oakland (Res., 2575 Le Conte St.), Berkeley 4, Calif.

KINWORTHY, WILLIAM RUSSELL, JR. (Jun. '45), Lt., U.S.N., Lakewood Road, Moberly, Mo.

KRAUS, CHARLES CONRAD, JR. (Assoc. M. '46), Chf., Special Projects Section, U.S. Engr. Office, 8th Floor Standard Oil Bldg. (Res., 3132 Pressman St.), Baltimore, Md.

LACAZE, LEONARD (Assoc. M. '46), Structural Engr., U.S. Engr. Office (Res., 718 North Ash), Little Rock, Ark.

LESLIE, LLOYD OWEN (Jun. '46), Jun. Asst. Engr. (R), Malaria Control in War Areas, U.S. Public Health Service, 605 Volunteer Bldg., Atlanta, Ga. (Res., 729 Pine, Canon City, Colo.)

LICHENSTEIN, MORRIS ABRAHAM (Jun. '46), Engr. in Airport Development, City and County of San Francisco, 425 Mason St. (Res., 2120 Great Highway), San Francisco 16, Calif.

LIGHTCAP, RICHARD CLIFFORD (Assoc. M. '45), Design Engr. (Squad Boss), Carnegie-Illinois Steel Corps., Ohio Works-Salt Springs Rd. (Res., 353 Park Ave.), Youngstown 4, Ohio.

LINCOLN, ROBERT ALEXANDER (M. '46), Civ. and San Engr., 1 Hillside Ave., Great Neck, N.Y.

MCDANIEL, SILAS WINFIELD (Jun. '46), Office Engr., Alder Dam., 2d Nisqually Power Project, Alder (Res. 1408 North Cedar St., Tacoma 6), Wash.

MEEM, STEPHEN HALSEY, JR. (Assoc. M. '46), (John S. Hale and Associated Civ. Engrs.), Echols Bldg., Staunton, Va.

MEHTA, MEHLLI ARDESHIR (Assoc. M. '46), Senior Asst. Engr., The Concrete Assn. of India, 20 Hamam St., Fort Bombay, India.

MONACO (OTINO), WILLIAM JOSEPH (Jun. '46), Constr. Engr., Sanderson & Porter, 52 William St., New York 5, N.Y.

MORABITO, BRUNO PAUL (Jun. '45), Application Engr., Carrier Corp., Geddes St., Syracuse (Res., 410 Galster Ave., East Syracuse), N.Y.

MORGAN, CHARLES PAGE (Assoc. M. '46), Chf. Bldg. Insp., City of Long Beach, City Hall, 222 Pacific (Res., 1357 Elm Ave. 5), Long Beach 6, Calif.

MURRAY, ROBERT WESLEY (Jun. '46), Ensign, CEC, U.S.N.R., San Diego Aqueduct Project, Vista, Calif.

OWEN, STANLEY FELIPE (Assoc. M. '45), Asst. Engr., Public Works Dept., Care, Head Office, P.W.D., Kuala Lumpur, Malaya.

PAHL, RUDOLPH MENTZ (Assoc. M. '46), 1084 Cragmont Ave., Berkeley, Calif.

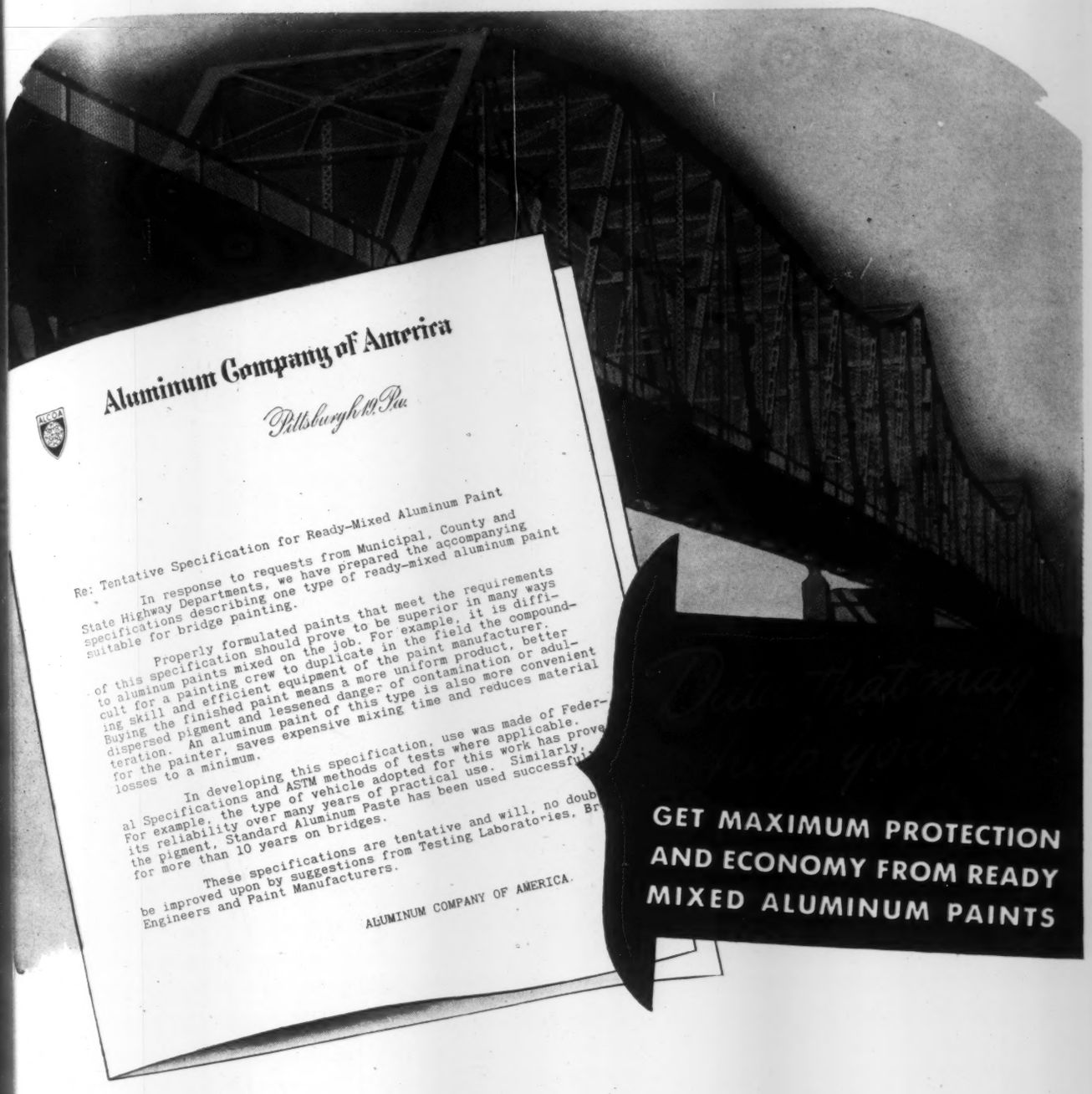
PATRICK, JOE PEELER (Jun. '46), Civ. Engr., Greeley and Hansen, 220 South State St. (Res., 4222 North Keystone Ave.), Chicago 41, Ill.

PAULSON, BOYD COLTON (Jun. '45), Ensign, CEC, U.S.N., 34 Brown St., Wickford, R.I.

PETERS, MELVIN HARRY (Assoc. M. '46), Engr., D. S. Warfel, 452 North Prince St. (Res., Route 2), Lancaster, Pa.

POTTER, WILLIAM EVERETT (M. '46), Col., Corps of Engrs., U.S. Army, Dist. Engr., U.S. Engr. Office, 601 Davidson Bldg., Kansas City, Mo.

QUINNELL, FRED CLARENCE (Assoc. M. '46), Dist. Engr., State Highway Dept., Franklin and LaSalle Sts. (Res., 1916 Whitman Ave.), Butte, Mont.


Aluminum Company of America
Pittsburgh 19, Pa.
Re: Tentative Specification for Ready-Mixed Aluminum Paint
In response to requests from Municipal, County and State Highway Departments, we have prepared the accompanying specifications describing one type of ready-mixed aluminum paint suitable for bridge painting.
Properly formulated paints that meet the requirements of this specification should prove to be superior in many ways to aluminum paints mixed on the job. For example, it is difficult for a painting crew to duplicate in the field the compounding skill and efficient equipment of the paint manufacturer. Buying the finished paint means a more uniform product, better dispersed pigment and lessened danger of contamination or adulteration. An aluminum paint of this type is also more convenient for the painter, saves expensive mixing time and reduces material losses to a minimum.
In developing this specification, use was made of Federal Specifications and ASTM methods of tests where applicable. For example, the type of vehicle adopted for this work has proved its reliability over many years of practical use. Similarly, the pigment, Standard Aluminum Paste has been used successfully for more than 10 years on bridges.
These specifications are tentative and will, no doubt be improved upon by suggestions from Testing Laboratories, Bridge Engineers and Paint Manufacturers.
ALUMINUM COMPANY OF AMERICA.
GET MAXIMUM PROTECTION AND ECONOMY FROM READY MIXED ALUMINUM PAINTS

If you are one of those who must buy on specification only, this "Tentative Specification for Ready Mixed Aluminum Paints" may guide you to new economies. As its preface states, "Properly formulated paints that meet the requirement of this specification should prove superior in many ways to aluminum paint mixed on the job . . . it is difficult to duplicate in the field the compounding skill and efficient equipment of the paint manufacturer . . . more uniform . . . better dispersed pigment . . . less adulteration. Also . . . more convenient, saves mixing time, reduces material losses . . ."

This is not an effort to change your mind if you are an advocate of job-mixed aluminum paints. But it presents an opportunity to take advantage of recent improvements in pigment and vehicles. Either way, Alcoa Albron pigment, made of aluminum more than 99% pure, assures painting satisfaction. ALUMINUM COMPANY OF AMERICA, 1918 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA ALBRON PASTE

for Aluminum Paint

ALCOA ALUMINUM

ALBRON

READ, RICHARD STANLEY (Assoc. M. '46), Civ. Engr., Holoway Bros. (London) Ltd., The Priory, Winkledon Common, London S.W. 19, England.

REEN, CALVIN GILBERT (Assoc. M. '46), Prof., Eng. Extension, The Pennsylvania State College, Room 8, Eng. F., State College, Pa.

ROSSO, ROBERT NEIL, JR. (Jun. '46), Engr. (Field), The Christman Co., Lansing (Res., 430 Charles St.), East Lansing, Mich.

RUGGLES, WILLIAM LEE (Jun. '45), Ensign, CEC, U.S.N.R.; 1411 Massachusetts St., Lawrence, Kans.

RUPPERT, EDWIN LEITH (Assoc. M. '46), Head, Environmental Sanitation Section, Div. of Public Health Eng., State Dept. of Health, 1403 Smith Tower, Seattle 4, Wash.

SAMUELSON, ROGER BENJAMIN (Jun. '45), Ensign, U.S.N., Public Works Dept., Naval Net Depot, Melville, R.I.

SECCHIA, FRANK FELIX (Jun. '46), Ensign, CEC, U.S.N.R., 30–38 Thirty-sixth St., Astoria, N.Y.

SHANAFELT, GEORGE OTIS (Jun. '45), Research Fellow, Univ. of Washington, Seattle (Res., Route 3, Box 286, Bothell), Wash.

SINES, FRANCIS JACK (Jun. '45), Ensign, U.S.N.R.; 214 South 70th St., Tacoma 4, Wash.

SITZ, MOSHE (Assoc. M. '46), Chf. Engr., Water Research Bureau, Box 283, Jerusalem, Palestine.

SJOSTRAND, THOR HELMER (Jun. '45), Ensign, CEC, U.S.N.R.; 680 Eleventh St., San Bernardino, Calif.

SLAUGHTER, GEORGE MCCLELLAN (Jun. '45), Ensign U.S.N., Civ. Works Engrs., Room 910, 90 Church Street, New York 7, N.Y.

STUBBLEFIELD, EWART EARL (Assoc. M. '45), Dist. Engr., Public Roads Administration, Box 3081, Capitol Station, Oklahoma City, Okla.

TERRAZAS, EMILIO (Jun. '46), Asst. Highway Engr., Bolivian Development Corp., Casilla 226, La Paz, Bolivia.

THOMPSON, WAYNE ARTHUR (Jun. '46), Arthur, Iowa.

THOMSON, GEORGE CECIL (Jun. '46), Estimating Engr., Southern California Gas Co., 1700 Santa Fe Ave., Los Angeles (Res., 933-C North Glendale Ave., Glendale 6), Calif.

TODD, HAROLD JOHN (Jun. '45), Asst. Project Engr., CEC, U.S.N.; Public Works Dept., Mare Island Shipyard, (Res., 920 Virginia), Vallejo, Calif.

WARD, LORRIN LEROY (Jun. '46), Graduate Civ. Engr., William H. Brady, Civ. Engr., 910 Baker St., Room 9, Bakersfield, Calif.

WARD, RAYMOND CALVIN (Jun. '46), Ensign, U.S.N.R.; 1201 Madeline Ave., El Paso, Tex.

WATERBURY, JAMES ABRAM (Assoc. M. '45), Res. Engr., U.S. Engrs., 8th and L Sts. (Res., 1932 Vallejo Way), Sacramento, Calif.

WEAVER, WILLIAM HOLT (Assoc. M. '46), Gen. Mgr., DeKalb County Water System, Decatur, Ga.

WITT, FREDERICK PHILIP (Assoc. M. '46), Structural Designer, Ebasco Services, Inc., 2 Rector St., New York (Res., 15 Wellington Place, Hempstead), N.Y.

TOTAL MEMBERSHIP AS OF MAY 9, 1946

Members	6,374
Associate Members	8,235
Corporate Members	14,609
Honorary Members	36
Juniors	6,627
Affiliates	77
Fellows	1
Total	21,350
(May 9, 1945	20,722)

WOOD, LAWRENCE ENGLE (Assoc. M. '46), Designing Engr., Black & Veatch, 4706 Broadway (Res., 5247 Olive), Kansas City 4, Mo.

YUGE, SHIGEO (Jun. '45), Private, U.S. Army, Prov. Company F, 2d Platoon, Army Post Office 21623, Care, Postmaster, New York, N.Y.

MEMBERSHIP TRANSFERS

ADAMS, JOHN AMOS, JR. (Jun. '42; Assoc. M. '45), Associate Hydr. Engr., Corps of Engrs., Office, Chf. of Engrs., 23d and Virginia, Washington 25, D.C.

BORG, JOSEPH ELMER (Jun. '37; Assoc. M. '46), Structural Engr. (Brooks-Borg), 815 Hubbell Bldg., Des Moines, Iowa.

CRONKRIGHT, ARTHUR BRADFORD (Jun. '36; Assoc. M. '46), San. Engr., Greenwich Water Co., Greenwich, Conn.

DAYTON, CEDRIC LODGE (Assoc. M. '31; M. '46), Chg. of Eng. Dept., Concrete Steel Co., 2 Park Ave. New York (Res., 16 Hollywood Ave., Tuckahoe 7), N.Y.

ERB, CARL LEE, JR. (Jun. '40; Assoc. M. '45), Asst. Engr., Howard, Needles, Tammen & Bergendoff, 921 Walnut, Kansas City 6, Mo.

FAHLQUIST, FRANK EDWIN (Jun. '25; Assoc. M. '30; M. '46), Cons. Engr. and Geologist, 17 Brook St., Riverside 15, R.I.

FERNALD, GORDON HILDRETH, JR. (Jun. '33; Assoc. M. '45), Engr., Corps of Engrs. U.S. Army, 500 Pittock Block (Res., 3208 North East Hoyt), Portland 12, Ore.

FISCHER, MERLE EDWARD (Jun. '34; Assoc. M. '46), Associate Bridge Engr., Bridge Dept., State Div. of Highways, Box 1499 (Res., 711 Forty-sixth St.), Sacramento 16, Calif.

FUTRAL, ALLEN ASHLEY (Jun. '32; Assoc. M. '46), Structural Engr., Technical Section, Constr. Div., U.S. Veterans Administration (Res., 615 Ormewood Ave., South East), Atlanta, Ga.

GENTRY, BRUCE AGAR (Jun. '41; Assoc. M. '46), Asst. Highway Engr., State Highway Div. (Res., 1644½ Preuss Road), Los Angeles 35, Calif.

GILL, SAMUEL CHRISWELL, JR. (Jun. '35; Assoc. M. '46), Lt. Comdr., CEC, U.S.N.R.; Gen. Delivery, Stanford University, Calif.

HARTUNG, THEODORE BERNARD (Jun. '39; Assoc. M. '46), Engr., Philadelphia Constr. Office, U.S. Maritime Comm., 1015 Chestnut St. (Res., 301 South 15th St.), Philadelphia 2, Pa.

HERMAN, BRUCE ALFRED (Jun. '33; Assoc. M. '46), Asst. Engr., J. E. Greiner Co., 1201 St. Paul St. (Res., 3821 Kimple Road), Baltimore 18, Md.

HOLZER, FRANK (Assoc. M. '35; M. '46), Res. Engr., Fay, Spofford & Thorndike, Apartado 210, La Guaira, Venezuela, S.A.

HOYEM, CARL HAAKON (Jun. '35; Assoc. M. '46), Engr., Par Eng. and Constr. Co., 105 East Gravey Blvd., San Gabriel (Res., 505 West Ramona Blvd., Alhambra), Calif.

JOHNSON, EMORY EMMANUEL (Jun. '36; Assoc. M. '46), Asst. Prof. of Civ. Eng., Univ. of Kansas, 209 Marvin Hall, Univ. of Kansas (Res., 1709 Indiana St.), Lawrence, Kans.

JUPENLAZ, WILFRED (Assoc. M. '29; M. '46), Civ. Engr., John W. Cunningham and Associates, 1112 Spalding Bldg., Portland 4, Ore.

LORING, SAMUEL JASPER (Jun. '36; Assoc. M. '46), Consultant of Technical Problems, 29 Stiles St., Stratford, Conn.

MCCUNE, FREDERICK LEOPOLD (Jun. '35; Assoc. M. '45), Associate Structural Engr., U.S. Army Engrs. (Res., 8722 Seventeenth Ave., Northwest), Seattle, Wash.

MCKENZIE, ANDREW JACKSON, JR. (Jun. '41; Assoc. M. '46), Vice-Pres. and Gen. Mgr., McKenzie Constr. Co., 2800 Transit Tower, San Antonio, Tex.

MEANS, ROBERT ROY (Jun. '39; Assoc. M. '46), Office Engr. (Field), U.S. Engr. Dept., U.S. Engr. Field Office, Permafrost, Army Post Office 731, Seattle, Wash.

MERCER, LESLIE BOYD (Assoc. M. '30; M. '46), Chf. Engr., Ready Mixed Concrete, Ltd., 401 Collins St., Melbourne, C.I., Victoria, Australia.

MILLER, JACOB JOHN (Jun. '37; Assoc. M. '46), Engr., Kappe & Associates, Room 418, Evans Bldg., 1420 New York Ave., N.W., Washington 5, D.C. (Res., 3569A South Stafford St., Arlington, Va.)

NELSON, LEE EDWARD (Jun. '42; Assoc. M. '46), Engr. (Hydr.), U.S. Engr. Office, Davidson Bldg. (Res., 2608 East 73d St.), Kansas City 5, Mo.

RINNE, JOHN ELMER (Jun. '31; Assoc. M. '39; M. '46), Engr., Standard Oil Co. of California, 225 Bush St., San Francisco (Res., 851 The Alameda, Berkeley 7), Calif.

ROBIN, SIDNEY (Jun. '40; Assoc. M. '46), Civ. Engr., 912 Gibson Ave., Philadelphia 11, Pa.

SCHAILL, HAROLD ARTHUR (Jun. '34; Assoc. M. '46), Engr., Whiting Corp. (Res., 289 East 148th Pl.), Harvey, Ill.

STALLWORTH, THOMAS WILLIAM (Jun. '36; Assoc. M. '46), 1117 North West 34th St., Oklahoma City 6, Okla.

ST. JOHN-RUSSELL-DE LYS-GREGSON, HARRY (Assoc. M. '29; M. '46), Cons. Engr., 54 Chawringhee Road, Calcutta, India.

STRAUS, HAROLD SELIG (Jun. '34; Assoc. M. '46), Engr. (P-2), U.S. Engr. Office (Res., 216 Greenoak Drive), Huntington 1, W.Va.

TILDEN, NORMAN EDGAR (Jun. '43; Assoc. M. '46), Chf. Engr., Dominican Seaboard Oil Co., Inc., Apartado 111, Ciudad Trujillo, Dominican Republic.

TOWSLEY, IRVING SIDNEY (Jun. '21; Assoc. M. '25; M. '46), Cons. Engr., 112 South 16th St., Philadelphia 2, Pa.

VOGEL, HAROLD RAY (Jun. '42; Assoc. M. '46), Estimating Engr., Kenny Constr. Co., 111 West Washington St., Chicago, Ill.

WHITLOCK, HAROLD JOHN (Assoc. M. '31; M. '46), Engr., Bridge Dept., State Div. of Highways, Public Works Bldg. (Res., 2240 Markham Way), Sacramento 17, Calif.

WOOLVERTON, MARGARET GENEVIEVE (Jun. '37; Assoc. M. '46), Traffic Engr., National Safety Council, 20 North Wacker Drive, Chicago 6, Ill.

ZAPF, FRITZ (Jun. '41; Assoc. M. '45), Senior Civ. Engr., Room 204, City Hall, Alameda, Calif.

REINSTATEMENTS

DRUSCHEL, RUSSELL HENRY, Assoc. M., reinstated Apr. 10, 1946.

FOLLETT, DONALD GORDON, Assoc. M., reinstated Jan. 1, 1946.

FRANK, JACOB, Assoc. M., reinstated Jan. 1, 1946.

GOWEN, JOHN FELLOWS, Assoc. M., reinstated Jan. 1, 1946.

GRILLO, ODAIR, Jun., reinstated Apr. 22, 1946.

HOLBY, FRANK AVIL, M., reinstated Apr. 19, 1946.

HORN, SAMUEL JAMES, Assoc. M., reinstated Jan. 1, 1946.

KEMPTON, JOHN PARKER, Jun., reinstated Jan. 1, 1946.

LI. WEN-PANG, Assoc. M., reinstated Jan. 1, 1946.

MCKEE, JACK EDWARD, Jun., reinstated Jan. 1, 1946.

Change of Address

Please fill in and mail this form whenever you change your address

SECRETARY, ASCE, 33 W. 39th St., New York 18, N.Y.

Please change my address to the following:

Name.....

Your Title.....

Firm Name.....

Street Address.....

City.....P.O. Zone No.....State.....

Home Address.....

City.....State.....

Nature of Business.....

Mailing and Publications to ☐ Home ☐ Business

Listing in Yearbook to include:

☐ Home only ☐ Business only ☐ Home and Business

Northern Pacific R. R. Bozeman Tunnel, through Belt Range of Rockies between Livingston and Bozeman, built with Pozzolith Concrete.

BOZEMAN TUNNEL built with POZZOLITH

Faced with the problem of meeting three important concrete requirements, the Northern Pacific Engineers turned to Pozzolith, Cement Dispersion and obtained concrete having:

1. *Increased* workability with *reduced* water content.
2. *Increased* early as well as ultimate strength.
3. *Increased* watertightness . . . also greater durability.

Pozzolith produces all the benefits of air entrainment and does so with increased strength and at lower cost. Findings of the Nation's top testing authority prove this. Pozzolith's high standard of performance has won it wide acceptance as use in millions of cubic yards of concrete testify.

Illustrated Pozzolith booklet gives complete information. *Write for a copy today.*

THE MASTER BUILDERS COMPANY

CLEVELAND 3, OHIO • TORONTO, ONTARIO

MASTER BUILDERS

THE TRUTH ABOUT

UNTIL now, you've heard about Aquella from everybody but us. First...there was Kurt Steel's absorbing article ("Dry Cellars") in the December 15, 1945 issue of Forbes Magazine.

Second...there was the condensation of this same article which appeared under the caption "Water Stay Away from My Wall" in the January issue of the Reader's Digest.

Third...there was a flood of anonymous letters containing garbled references to a Federal Trade Commission complaint, as well as a copy of a letter dated December 29th, 1945, which purported to have come from the Director of the United States Bureau of Standards.

Why you've not heard from us until now...

In the first place, we were far too busy getting out production to meet the nationwide demand for Aquella. Thousands wanted to be Aquella distributors. Thousands wanted to be Aquella dealers and contractors. And many, many thousands more wanted to buy Aquella for homes, institutions, and factories. Aquella had captured the public's imagination overnight.

Furthermore, at first we thought that this anonymous attack was just the work of some small, misguided competitor. Then, when the vast extent of the campaign became apparent, we conducted an investigation into the source and motives behind the attack.

The complete details and documentary evidence are to be found in our brochure "The Truth About Aquella."

The Bureau of Standards never intended to discredit Aquella

On December 29, 1945, an unsigned letter came from the office of the United States Bureau of Standards written to Forbes Magazine and the Reader's Digest, protesting the publication of Mr. Steel's article.

After the Director of the Bureau was informed this letter was being reproduced and circulated by the hundreds of thousands for the purpose of disparaging Aquella, the Bureau refused to permit further public distribution of copies.

What the Bureau then did was to write *other letters* stating that the communication of December 29, 1945 was not intended to discredit Aquella.

Nevertheless, thousands of copies of that early letter still continued to be circulated through "mysterious sources."

The complete details and documentary evidence are to be found in our brochure "The Truth About Aquella."

AQUELLA...

The Controversy over "Waterproofing" before the Federal Trade Commission

For sometime back there has been a controversy between the Federal Trade Commission and the waterproofing-industry-at-large concerning the use of the word "waterproof" in advertising. What it boils down to is a definition of the word "waterproof" and not any misstatement of fact. Members of the Commission have their definition; those in the waterproofing industry have theirs. The maker of Aquella was only one of many firms that were cited on the issue.

This issue was raised almost a year ago and a complete answer was promptly filed. No further action was taken.

In the meantime, however, there emanated from the same "mysterious sources," thousands of notices of the Commission's citation—with the dateline conspicuously omitted.

The complete details and documentary evidence are to be found in our brochure "The Truth About Aquella."

Now about AQUELLA itself!

From the time it proved itself on the French Maginot Line, Aquella has demonstrated its effectiveness against moisture and seepage in thousands of instances, in various types of masonry construction. There is no single instance where Aquella has ever failed *when properly applied!*

Further, we are continuing permeability tests under hydrostatic pressures which far exceed any that were ever used on Aquella by the Bureau of Standards.

Complete Documentary Evidence for you!

We have prepared a fully documented brochure which contains the complete story of Aquella.

If you are in the waterproofing industry...if you sell waterproofing...if you are counseling customers or clients on waterproofing...or if you are a buyer of waterproofing materials, you owe it to yourself to know the truth!

A copy of this brochure is yours for the asking. Simply write us on your letterhead.

PRIMA PRODUCTS, INC.

NATIONAL DISTRIBUTORS

Dept. K, 10 East 40th Street, New York 16, New York

McKERGAN, JAMES JOSEPH, Assoc. M., reinstated Jan. 1, 1946.

SHACKLETON, ALLEN ROY, Jun., reinstated Jan. 1, 1946.

VOORHEES, BOYNTON STEPHEN, M., reinstated Jan. 1, 1946.

WEIGHT, WM. KING, Jun., reinstated Apr. 22, 1946.

RESIGNATIONS

CASSADY, EARL WHITTON, Assoc. M., resigned Mar. 13, 1946.

LOTT, JAMES GUY, Assoc. M., resigned Apr. 9, 1946.

McNEAR, ROBERT BARTON, Assoc. M., resigned Mar. 15, 1946.

McKENDRICK, MAURICE NILSSON, Jun., resigned Apr. 4, 1946.

MORRIS, ROBERT DEWAR, Jun., resigned Mar. 7, 1946.

PIKE, LLOYD FRANKLIN, Jun., resigned Apr. 26, 1946.

TRASK, GEORGE FRANCIS DONNELL, M., resigned Dec. 31, 1945.

Applications for Admission or Transfer

Condensed Records to Facilitate Comment from Members to Board of Direction

JUNE 1, 1946 NUMBER 6

The Constitution provides that the Board of Direction shall elect or reject all applicants for admission or for transfer. In order to determine justly the eligibility of each candidate, the Board must depend largely upon the membership for information.

Every Member is urged, therefore, to scan carefully the list of candidates published each month in CIVIL ENGINEERING *and to furnish the Board with data which may aid in determining the eligibility of any applicant.*

It is especially urged that a definite recommendation as to the proper grading be given in each case, inasmuch as the grading must be based upon the opinions of those who know the applicant personally as well as upon the nature and extent of his professional experience. Any facts derogatory to the personal character or professional reputation of an applicant should be promptly communicated to the Board.

Communications relating to applicants are considered strictly confidential.

The Board of Direction will not consider the applications herein contained from residents of North America until the expiration of 30 days, and from non-residents of North America until the expiration of 90 days from the date of this list.

MINIMUM REQUIREMENTS FOR ADMISSION

GRADE	GENERAL REQUIREMENT	AGE	LENGTH OF ACTIVE PRACTICE	RESPONSIBLE CHARGE OF WORK
Member	Qualified to design as well as to direct important work	35 years	12 years	5 years RCM*
Associate Member	Qualified to direct work	27 years	8 years	1 year RCA*
Junior	Qualified for subprofessional work	20 years	4 years	
Affiliate	Qualified by scientific acquirements or practical experience to cooperate with engineers	35 years	12 years	5 years RCM*

* In the following list RCA (responsible charge—Associate Member standard) denotes years of responsible charge of work as principal or subordinate, and RCM (responsible charge—Member standard) denotes years of responsible charge of IMPORTANT work, i.e., work of considerable magnitude or considerable complexity. The time statements shown are as presented by the applicant.

APPLYING FOR MEMBER

ALEXANDER, VERNE (Assoc. M.), Kansas City, Mo. (Age 40) (RCA 2.0 RCM 7.1) Oct. 1939 to date with U.S. Weather Bureau, Kansas City, Mo., since Jan. 1942 as Regional Engr.

ANDREWS, ROBERT MARKWOOD, Harrisburg, Pa. (Age 50) (RCM 21.1) Feb. 1944 to date City Engr., Harrisburg, Pa.; previously Chf. Engr. of design, Project Mgr. and Supt. of Constr., F. H. McGraw & Co., New York City and Hartford, Conn.

ARENA, JOSEPH RICHARD (Assoc. M.) Chicago, Ill. (Age 37) (RCA 2.6 RCM 12.9) May 1945 to date Structural Designing Engr., American-Marietta Co.; previously Tech. Engr., Todd-Houston Shipbuilding Corporation; Associate Structural Engr., U.S. Engrs., Jacksonville, Fla.

ASPLUND, SVEN OLOF, Orebro, Sweden. (Age 43) (RCA 3.7 RCM 16.5) May 1931 to date private practice, as S. O. Asplund, Contr., Orebro, Sweden.

BEAN, RICHARD ABBOTT, New Rochelle, N.Y. (Age 47) (RCA 10.7 RCM 9.1) Dec. 1940 to date with Corps of Engrs., U.S. Army as Major, Lt. Col. and since Dec. 1945 Col. (on terminal leave).

BENNISON, ERNEST WILLIAM (Assoc. M.) St. Paul, Minn. (Age 60) (RCA 3.2 RCM 26.9) Jan. 1939 to date Office Engr., Edward E. Johnson, Inc.

BLACK, ROBERT ALEXANDER (Assoc. M.), Chicago, Ill. (Age 50) (RCM 11.4) 1934 to date Prin. Civ. Engr. (1 yr.) and Asst. Chf. Engr., Chicago Park Dist.

BROOK, EDWARD JOSEPH, Los Angeles, Calif. (Age 45) (RCA 3.3 RCM 16.1) June to Sept. 1942 Engr., and Nov. 1945 to date Asst. to Pres., Franco Wyoming Oil Company, Los Angeles, Calif.; in the interim Lt. Comdr., CEC, USNR.

BURBANK, OSCAR FRANK (Assoc. M.), Worcester, Mass. (Age 67) (RCM 27.9) 1918 to date Supt., Mt. Hope Cemetery.

BURNS, ROBERT VALENTINE, Colombo, Ceylon. (Age 47) Jan. 1937 to date Div. Irrigation Engr., Irrigation Dept. Govt. of Ceylon.

CAMPBELL, DUNCAN McEVOY (Assoc. M.), Chicago, Ill. (Age 51) (RCA 3.5 RCM 16.5) Dec. 1929 to date Cook County Highway Dept., since Aug. 1939 as Chf. Engr.

CHURCH, GILBERT PATTERSON, Wilmington, Del. (Age 36) (RCA 4.4 RCM 6.1) Oct. 1933 to date with E. I. du Pont de Nemours & Co., since Sept. 1945 as Asst. Mgr., Constr. Div., Eng. Dept., Wilmington, Del.

CLARK, ROBERT NEWTON, Ithaca, N.Y. (Age 42) (RCA 3.5 RCM 11.0) March 1941 to Nov. 1945 with U.S. Army as Chief, San. Eng. Sec., after July 1945 with Ninth Service Command.

CLIFFORD, CARLETON MERRITT, APO 722, Minneapolis, Minn. (Age 40) Jan. 1937 to date with Corps of Engrs., U.S. Army, at present as Colonel, being Commanding Officer, Northwest Dist., 6th Service Command and Deputy Div. Engr., Great Lakes Div.

CONWAY, CLARENCE DEXTER (Assoc. M.), Los Molinos, Calif. (Age 57) (RCA 5.9 RCM 30.2) March 1916 to date with Coneland Water Co., Los Molinos, Calif.; since Jan. 1920 also private practice designing and supervising construction of irrigation systems and preparing land for irrigation.

COSTELLO, JOHN LAWRENCE, Philadelphia, Pa. (Age 59) (RCA 2.3 RCM 26.7) Aug. 1919 to date with Civ. Service Comm., since June 1944 as Pres.

CRAMER, GEORGE EDGAR, JR., Pittsburgh, Pa. (Age 59) (RCA 16.3 RCM 9.8) July 1942 to date Mining Engr., Eavenson & Auchmuty, Pittsburgh, Pa.; previously Draftsman with Alex Hutchinson, Civ. and Mining Engr., Wilkinsburg, Pa.

DEERING, MARK FAY (Assoc. M.) Burbank, Calif. (Age 46) (RCA 6.9 RCM 11.9) June 1934 to Jan. 1945, Senior Design Engr. with S. B. Barnes, Cons. Engr., and Jan. 1945 to date, Cons. Engr. with S. B. Barnes & Associates, Los Angeles, Calif.

DEL BURGO, JACOB JOSEPH (Assoc. M.), Bronxville, N.Y. (Age 51) (RCA 4.8 RCM 7.2) March to Oct. 1943 and July 1944 to date, Designing Engr., until Oct. 1943 with Petro-chem Development Co., Inc., and since July 1944 with Pardo, Proctor, Freeman & Mueser, Caracas, Venezuela; Aug. 1940 to March 1945 with Frederic R. Harris, Inc., New York City.

DREW, SAMUEL TILTON (Assoc. M.), Guatemala City, Guatemala. (Age 47) (RCA 5.7 RCM 10.6) 1942 to date with Inst. of Inter-American Affairs, Div. of Health & Sanitation, Guatemala, since 1945 as Chf. of Party; previously with Metcalf & Eddy, Boston, Mass.

DRYDEN, CHARLES WATSON, Flagstaff, Ariz. (Age 36) (RCA 1.6 RCM 5.3) Feb. 1944 to date City Engr., Flagstaff; previously Engr. and Supt. of Constr., Ordnance Dept.; Party Chief with City of Tucson, B. W. Reynolds, and Prouty Bros. Engr. Co.

FARMER, CHARLES FREDERICK, Portland, Ore. (Age 57) (Claims RCA 5.0 RCM 19.2) April 1942 to date with National Tank & Pipe Co., Portland, Ore., since Jan. 1945 as Constr. Engr.; previously in private practice of engineering in Montana; Dist. Mgr., American Wood Pipe Co., Missoula, Mont.

GIFFT, HOWARD MERRILL (Assoc. M.) Ithaca, N.Y. (Age 37) (RCA 7.0 RCM 7.7) Sept. 1941 to date Asst. and Associate Prof., Cornell Univ.; also part of time with C. E. O'Rourke, Cons. Engr.; previously Instructor and graduate student, Iowa State Coll. also with W. E. Galligan, San. Engrs., on design of sewage treatment plant.

HANDS, STANLEY MOORE (Assoc. M.), Oakland, Calif. (Age 55) (RCM 15.8) Aug. 1940 to date Testing Engr., Eng. Materials Lab., City of Oakland.

HANSEN, RAYMOND CHARLES, Portland, Ore. (Age 50) (RCA 3.0 RCM 20.0) 1919 to date with National Tank & Pipe Co., Portland, Ore., since 1926 as Chf. Engr.

HARTMAN, HARRY ROBERT, Chicago, Ill. (Age 40) (RCA 3.1 RCM 10.1) Feb. 1945 to date Chf. Engr., Witco Chemical Co., Chicago, Ill.; previously with Continental Oil Co., finally as Res. Engr.

HASTAIN, JAMES EDWIN, Phoenix, Ariz. (Age 45) (RCA 11.1 RCM 6.1) Jan. 1946 to date private practice, Phoenix, Ariz., specializing in structural design and industrial layouts; previously with Corps of Engrs., U.S. Army, finally as Col. being Director of Eng. and Supply, South Asia Command.

HAZARD, STUART GRAY (Assoc. M.), Topeka, Kans. (Age 39) (RCA 5.1 RCM 10.7) Feb. 1946 to date Cons. Engr. (private practice); Feb. 1942 to Feb. 1946 Major, Corps of Engrs., U.S. Army; previously member of firm, Finney & Hazard, Cons. Engrs., Topeka, Kans.

MACNAMEE, DANIEL FRANCIS, New Rochelle, N.Y. (Age 48) (RCA 4.4 RCM 21.3) Feb. 1925 to date Gen. Mgr. and Officer in charge of D. F. MacNamee & Co., Inc.

MATTERN, DONALD HECKMAN (Assoc. M.), Knoxville, Tenn. (Age 40) (RCA 5.0 RCM 6.5) Jan. 1938 to date with TVA, Project Planning Dept., finally as Senior Civ. Engr.

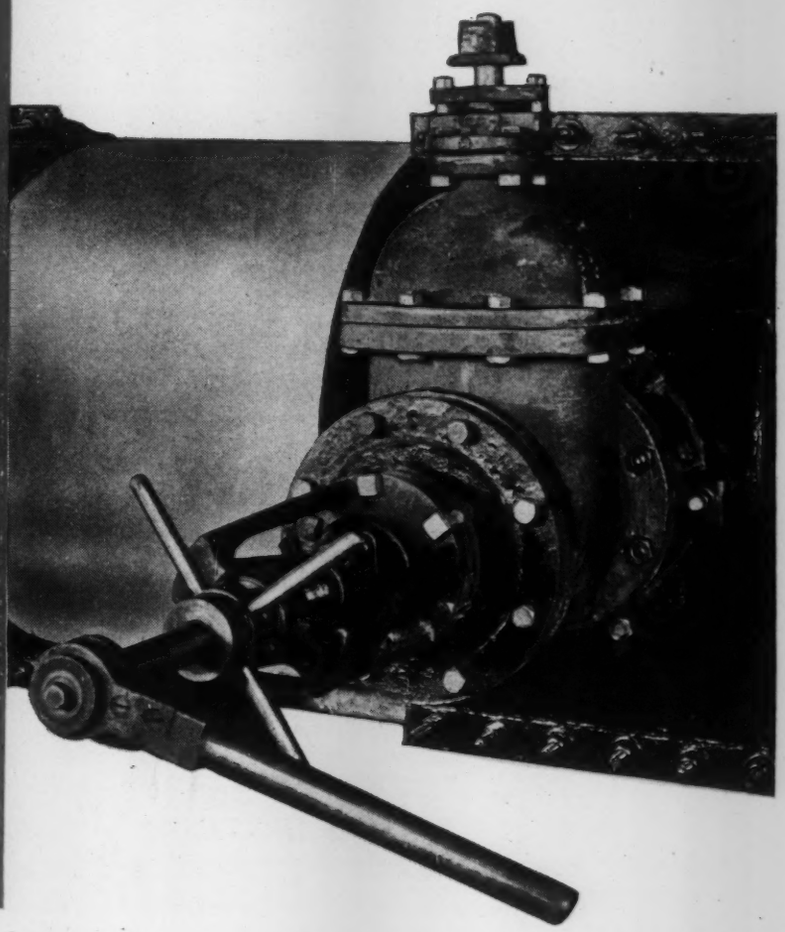
MENGEL, CARL WAYNE (Assoc. M.), Raleigh, N.C. (Age 57) (RCA 7.6 RCM 24.3) May 1942 to date with W. C. Olsen, Cons. Engr., and for Olsen & Dietrick Engr.-Archts., as Project Mgr.; previously Director, Dept. of Public Works and Service, Greensboro, N.C.

MIDDLETON, ALEXANDER GEORGE, Harve, Mont. (Age 62) (RCA 14.9 RCM 17.9) April 1927 to date with Montana Highway Dept., since March 1936 as Dist. Engr.

MORRISON, DEMING WILLIAM (Assoc. M.), Sacra-

ADVANTAGES OF PRESTRESSED CONCRETE CYLINDER PIPE • NO. 5

Easily and economically tapped...



• Prestressed Concrete Cylinder Pipe can be readily tapped under full operating pressure. This eliminates the necessity for dewatering the line when making connections not originally contemplated at the time of construction. The work can be done by regular maintenance crews with their own equipment.

Reducers, wyes, tees and elbows are made according to standard Lock Joint Pipe design . . . and constructed to meet every type of field condition. Prestressed Concrete Cylinder Pipe may be somewhat new to you *now* . . . but already hundreds of thousands of feet have been installed and additional hundreds of thousands of feet are under contract on major projects throughout the Western Hemisphere. In the meantime, let us help your engineers plan your next job and show you the advantages of specifying Prestressed Concrete Cylinder Pipe in sizes of 16" to 84"—and even larger—for high pressure pipelines.

A Hazen-Williams Hydraulic Slide Rule will gladly be sent upon request with our compliments.

LOCK JOINT Reinforced Concrete PRESSURE PIPE

LOCK JOINT PIPE COMPANY

Established 1905

P. O. BOX 269, EAST ORANGE, NEW JERSEY

Denver, Colo. · Chicago, Ill. · Kenilworth, N. J. · Kansas City, Mo. · Rock Island, Ill. Joplin, Mo. · Valley Park, Mo. · Cleveland, Ohio · Hartford, Conn. · Navarre, Ohio

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains in a wide range of diameters as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

mento, Calif. (Age 43) (RCA 6.5 RCM 9.9) Oct. 1935 to date with U.S. Engrs., since Dec. 1945 as Prin. Engr., Head of Design Office, Sacramento, Calif., previously Major and Lt. Col., Corps of Engrs.

MURPHY, GLENN (Assoc. M.), Ames, Iowa. (Age 38) (RCA 4.0 RCM 7.9) July 1938 to Sept. 1941 Assoc. Prof., and Sept. 1941 to date Prof. of Theoretical and Applied Mechanics, Iowa State Coll.

PALMER, JOHN ELLIOTT GEORGE, Oxshott, England. (Age 41) (RCA 2.5 RCM 5.8) April 1936 to April 1937 Asst. Engr., and March 1946 to date member of firm, Rendel, Palmer & Tritton, Cons. Engrs., Westminster; in the interim with the Admiralty.

PATTON, DAVID HAMMOND (Assoc. M.), Atlanta, Ga. (Age 45) (RCA 10.3 RCM 13.1) April 1933 to date Dist. Engr., Johns-Manville Co.

ROSE, FRANKLIN ORTH (Assoc. M.), Providence, R.I. (Age 55)(RCA 7.6 RCM 5.8) June 1942 to date Assoc. Prof. of Civ. Eng., Brown Univ.; previously Asst. Prof. and Assoc. Prof., Univ. of S.Calif.

RUPPEL, WALTER (Assoc. M.), San Francisco (4), Calif. (Age 50) (RCA 13.5 RCM 11.0) April 1925 to date with H. L. Haehl, Cons. Engr.; also private practice.

SETTLE, SAMUEL BRITTAN, Parkersburg, W. Va. (Age 45) (RCA 5.7 RCM 12.5) April 1944 to date, Cons. Engr., Parkersburg, W.Va.; previously Special Eng. Advisor to C. A. Ruf, Parkersburg; Gen. Chem. Defense Corporation; Development Engr., International Derrick & Equipment Co., Sept. 1941–Dec. 1941 Curtis-Wright Aircraft Corporation.

SHANKLIN, GEORGE ROBERT, Trenton, N.J. (Age 44) (RCA 10.3 RCM 9.9) July to Dec. 1945 Asst. Chf. Engr., and Dec. 1945 to date Hydr. Engr., Div. of Water Policy and Supply, New Jersey Department of Conservation; previously (7 years) Hydr. Engr., New Jersey State Water Policy Comm.

SHEIL, GLENISTER, Mt. Morgan, Queensland, Australia. (Age 44) (RCM 10.6) 1944 to date Asst. Gen. Mgr., Mt. Morgan, Ltd., Queensland; previously Civ. Engr., Hydro-Elec. Comm, Hobart.

SILITCH, EUGENE WLADIMIR, New York City. (Age 45) (RCA 6.6 RCM 12.5) June 1945 to date Pres., Ranney Method Water Supplies, Inc., Louisville, Ky.; previously Vice-Pres. and Managing Director, Ranney Water Collector Corporation of New York.

SMITH, HARRISON, (Assoc. M.), New York City. (Age 52) (RCA 2.4 RCM 33.0) 1921 to date with Sanderson & Porter, New York City, since 1930 as Partner.

SORGENFREI, OTTO FREDERICK, Memphis, Tenn. (Age 45) (RCA 6.0 RCM 9.3) 1937 to date with Modjeski & Masters, Cons. Engrs., Harrisburg, Pa., since 1943 as Res. Engr. on major bridge construction on Mississippi River at Memphis.

TOENNIES, ADLAI KOPP, Chicago, Ill. (Age 40) (RCM 5.6) April 1945 to date Engr. in charge of design, Refinery Eng. Co., Chicago; previously Eng. Designer with various companies.

TURNER, EDWARD MCGUIRE, Cochabamba, Bolivia. (Age 59) (RCA 2.6 RCM 14.1) Aug. 1945 to date Corporation Boliviana de Formento, Bolivia, as Cons. Engr. and (since Jan. 1946) Director of Public Works; previously with Tennessee Highway Dept., finally as Chf. Engr.

TUSKIND, EUGENE RANDALL (Assoc. M.), Bismarck, N.Dak. (Age 43) (RCA 8.0 RCM 10.6) 1937 to date with North Dakota State Highway Dept., since 1938 as Engr. of Surveys and Plans.

VAN KOUGHNET, WILLIAM NICHOLAS, Toledo, Ohio. (Age 45) (RCA 5.1 RCM 9.6) Oct. 1945 to date, Engr. (Civ.), Libby-Owens-Ford Glass Co., Toledo; previously Engr., Bellman, Gillette & Richards, Archts. and Engrs., Toledo; Asst. Engr., Detroit & Toledo Shore Line R.R.

WALLACE, GALEN ANSON, Chevy Chase, Md. (Age 49) (RCA 9.8 RCM 11.1) Nov. 1925 to date with Corps of Engrs., War Dept., since Aug. 1939 in office of Chf. of Engrs., Washington, D.C.

WARNER, HIRAM ALFORD, Dallas, Tex. (Age 56) (RCA 1.0 RCM 22.4) March 1944 to date Superv. Engr., Reconstruction Finance Corporation, Defense Plant Corporation, later Office of Defense Plants; previously Regional Traveling Engr. Inspector, FHA, FPHA.

WARNER, RAYMOND ALOYSIUS (Assoc. M.) Plymouth, Mich. (Age 45) (RCA 0.7 RCM 14.8) 1941 to date, Civ. Engr., Wayne County Rd. Comm., Detroit; previously, Designer, Mason L. Brown & Son.

WENDELL, EVERETT JOHN, Peoria, Ill. (Age 50) (RCA 4.2 RCM 16.2) April 1929 to date County Supt. of Highways, Peoria County, Ill.

WHITE, JOHN JOSEPH (Assoc. M.), Tuckahoe, N.Y. (Age 55) (RCA 11.6 RCM 19.1) Nov. 1945 to date Specification Writer, Parsons, Brinckerhoff, Hogan & Macdonald; previously Specification Writer, F. R. Harris, both of New York City.

APPLYING FOR ASSOCIATE MEMBER

ACKERMAN, JUDSON BAYNARD, San Francisco, Calif. (Age 35) (RCA 10.5) July 1943 to date with U.S. Navy, since Sept. 1944 as Officer in Charge, San. Eng. Sec., Public Works Dept., 12th Naval Dist.; previously San. Engr., U.S. Army, So. Atlantic Div.

ACKERMAN, SAMUEL MORRIS (Junior), Reno, Nev. (Age 31) (RCA 5.0 RCM 2.4) March 1942 to date with Corps of Engrs., U.S. Army, since Aug. 1945 as Major.

AHLF, AUGUST LOUIS (Junior), Denver, Colo. (Age 34) (RCA 4.9 RCM 5.0) Nov. 1936 to date Engr., Canal Div., Branch of Design and Construction, U.S. Bureau of Reclamation, Denver, Colo.

BAKER, ROBERT FULTON, Lexington, Ky. (Age 28) (RCA 4.1) Feb. 1946 to date Materials Engr., Highway Research Laboratory, Lexington, Ky.; previously with Corps of Engrs., U.S. Army, finally as Capt.; Grad. student, Purdue Univ.

BEHRENS, JOE CHARLES (Junior), Chicago, Ill. (Age 34) (RCA 5.1) Jan. 1946 to date Sewer Surveyor, Div. of Advance Sewer Planning, Chicago, Ill.; previously with Corps of Engrs., U.S. Army, finally as Lt. Col.

BERKEY, JAMES HENRY, Washington, D.C. (Age 33) (RCA 6.6 RCM 2.1) May 1942 to date with USNR, finally as Lt. Commdr.; previously with Chas. H. Tompkins Co.; Bldg. Constr., Huntington, N.Y.

BRYAN, ROSS HENRY, Diablo Heights, Canal Zone. (Age 36) (RCA 6.6 RCM 3.2) April 1946 to date Structural Designer, Office Eng. Div., The Panama Canal; previously with CEC, U.S. Navy, Structural Design Div., The Panama Canal.

CAIN, JOHN HARDISON, Atlanta, Ga. (Age 32) (RCA 4.7) 1941–1945 with U.S. Army, finally as Commanding Officer, 356 Ordnance Med. Maintenance Co.; previously and 1945 to date with Wiedemant Singleton, Engrs., now as Civ. Engr.

CAMPBELL, ROBERT RUSSELL (Junior), Berkeley, Calif. (Age 27) (RCA 4.2 RCM 1.6) July 1941 to date, with USNR as Ensign, Lt. (jg), Lt., Lt. Commdr., and Commdr. (SC), being Asst. to Planning Officer, later Planning Officer, Naval Supply Depot, Oakland, Calif.

CHAPMAN, MATTHEW MCGUIRE, Atlanta, Ga. (Age 35) (RCA 6.3 RCM 3.7) July 1940 to Aug. 1942 and Dec. 1945 to date Municipal Engr., Robert & Co. Inc., Architects & Engrs., Atlanta, Ga.; in the interim Officer, Corps of Engrs., U.S. Army.

CHIBARO, ANTHONY, Waban, Mass. (Age 42) (RCA 12.0 RCM 4.2) Sept. 1937 to date with Jackson & Moreland, Engrs., Boston, in various capacities, since April 1945 as Squad Boss.

CULLER, RICHARD CARLTON (Junior), Pittsburgh, Pa. (Age 34) (RCA 2.5) Aug. 1937 to date with Water Resources Branch, U.S. Geological Survey since Sept. 1941 as Asst. Engr.

DRESCHER, FRANCIS ANDREW (Junior), Ozone Park, N.Y. (Age 33) (RCA 4.6 RCM 0.4) Oct. 1938 to date with George A. Fuller Co., in various capacities, including Asst. Chf. Field Engr., Chf. Engr., and Asst. Supt.

EMMONS, WALTER FRANKLIN, Norris, Tenn. (Age 41) (RCA 10.0 RCM 3.0) Feb. 1936 to date with TVA, from July 1941 to June 1943 and Dec. 1945 to date as Senior Civ. Engr.

EWING, MERLE ALLEN, Sacramento, Calif. (Age 38 (RCA 4.2) Sept. 1928 to date with California Div. of Highways, since Oct. 1945 as Senior Structural Engr., Calif. Div. of Architecture, School Sec.

FLEMING, STUART REID, New York City. (Age 36) (RCA 4.9 RCM 2.7) April 1935 to date with Ford, Bacon & Davis, Inc., since Nov. 1945 as Project Mgr.

FOSS, RAYMOND JOHN, Louisville, Ky. (Age 50) (RCA 3.0) June 1942 to date with Speed Scientific School, Univ. of Louisville; since June 1945 as Asst. Prof., previously salesman.

HALL, DONALD GEORGE, Sacramento, Calif. (Age 39) (RCA 11.1 RCM 4.9) Dec. 1944 to date Gen. Supt., Hubert H. Everist Co., San Francisco, Calif.; previously Estimator and Gen. Supt. on private contracting.

HALL, LOUIS WOODROW, New York City. (Age 30) (RCA 4.0 RCM 1.4) March 1937 to June 1943 and Dec. 1945 to date with Turner Constr. Co., finally as Asst. Supt.; in the interim with the U.S. Navy, being underwater Demolition Officer.

HANCOCK, JAMES HARVEY (Junior), Memphis, Tenn. (Age 34) (RCA 1.8) Aug. 1945 to date Detailer and Engr., Pidgeon-Thomas Iron Co.; previously Senior Liaison Engr., McDonnell Aircraft Corporation; Detail Project Engr. and Project Engr., Fisher-Memphis Aircraft Corporation; Asst. Structural Engr., Panama Eng. Div., U.S. Army, with the Panama Canal.

HANSEN, RALPH CHRISTIAN (Junior), Toledo, Ohio. (Age 35) (RCA 2.1) Dec. 1945 to date Engr., L. O. F. Glass Co., Toledo, Ohio; previously Private to 2d Lt., U.S. Army, being Photomapping Officer; Jun. Designer, Owens-Illinois Can Co.

HARDY, WILLIAM RALPH (Junior), Fort Worth, Tex. (Age 44) (RCA 3.2) Sept. 1939 to June 1942 and Dec. 1945 to date City San. Engr., Dept. of Public Health & Welfare, Ft. Worth, Tex.; previously Lt. and Capt., San. Corps, U.S. Army.

JOHNSTON, JOHN MARTIN, Knoxville, Tenn. (Age 40) (RCA 3.0) Nov. 1940 to March 1946 Lt. Col., U.S. Army, being Ordnance Staff Officer; previously with TVA as Eng. Draftsman and Jun. Engr.

KELLER, CHARLES, JR., New Orleans (11), La. (Age 37) (RCA 6.2 RCM 0.3) July 1943 to July 1945 with Corps of Engrs., U.S. Army; previously with Galveston (Tex.) Engrs. Dist.; with U.S. Engrs.

LEE, HOWARD AUGUSTUS, Metuchen, N.J. (Age 42) (RCA 8.5 RCM 0.5) June 1945 to date Asst. Engr. of Design, Hudson & Manhattan R.R. Co.; previously Asst. Engr., Bitting, Inc., New York City; Designer, Pennsylvania Turnpike Comm., Harrisburg, Pa.

LI, EU-DIEN (Junior), Shanghai, China. (Age 34) (RCA 4.4) July 1942 to date Chf. Engr., Eddy Eng. Corporation, Shanghai, China; previously Prof. of Structural Eng., National Univ. of Amoy, Changting, Fukien, China.

LUDWIG, HARVEY FRED (Junior), San Pedro, Calif. (Junior) (Age 29) (RCA 4.5 RCM 1.2) Nov. 1942 to date with U.S. Public Health Service, since July 1944 as Senior Asst. Sanitary Engr., Washington D.C.; previously Civ. Engr., Western Regional Research Laboratory, USDA; with C. G. Hyde, Cons. Engr.

MAPES, JOE BURKETT (Junior), Fort Worth, Tex. (Age 32) (RCA 2.8) 1942 to 1943 and Jan. 1944 to date with Freese & Nichols, Ft. Worth, Tex., since Jan. 1944 as Res. Engr.; in the interim Asst. Engr., Consolidated Aircraft Corporation, Ft. Worth.

MILLARD, ROBERT WEST (Junior), Presidio of San Francisco, Calif. (Age 34) (RCA 2.1 RCM 10.0) Dec. 1927 to date Jun. Partner, F. W. Millard & Son, Mining and Civ. Engrs.; also, Nov. 1941 to July 1942 with Corps of Engrs., U.S. Army, since March 1943 as Assoc. Fortifications Engr.

NEWTON, CARROLL THOMPSON (Junior), Vicksburg, Miss. (Age 35) (RCA 2.7 RCM 4.0) Dec. 1945 to date Director, U.S. Waterways Experiment Station, Vicksburg, Miss.; Sept. 1940 to Dec. 1945 with U.S. Army, Corps of Engrs. finally as Regimental Commander.

NIELSEN PAUL ELLSWORTH, Fanwood, N.J. (Age 41) (RC 5.9) 1937 to date with Newark Coll. of Eng., since 1943 as Associate Prof.

PECK, GEORGE VAIL, Stanford University, Calif. (Age 42) (RCA 10.2 RCM 2.5) Sept. 1928 to date Acting Asst. Prof. of Civ. Eng., Stanford Univ.; 1944 to June 1945 also Asst. to Regional Representative of Eng. Science, and Management War Training for West Coast; previously Instructor, Asst. Prof., and Associate Prof. of Civ. Eng., Univ. of Pittsburgh; also Engr., Raybold Coupling Co.

PITTER, CUTHBERT ALTAMONT LINTON (Junior), Boston, Mass. (Age 34) (RCA 3.0) April 1945 to date San Engr. in B.W.I.; since Sept. 1945 attending Harvard Univ. of Fellowship from Rockefeller Foundation; previously with Malaria Research and Control; Gov't Medical Depot, Jamaica, B.W.I.

ROBINS, GEORGE PATRICK, Bartlesville, Okla. (Age 35) (RCA 1.3) Feb. 1944 to date Phillips Petroleum Co., Bartlesville, Okla., at present as Associate Design Engr., Gasoline Dept.; previously Structural Engr., Mid Continent Eng. Co., Dallas, Tex.; with Forsythe, Walaver & Kerchner, Archts. & Engrs.

SCHAFFER, HENRY FRANCIS, Carnegie, Pa. (Age 34) (RCA 5.7) April 1944 to date Structural Engr., Rust Eng. Co.; previously Design Engr. with C. H. Hunt, Cons. Engrs.; Structural Designer, Koppers Co., all in Pittsburgh, Pa.

TARZIAN, HAIG HARRY, Sacramento, Calif. (Age 38) (RCA 7.1) Aug. 1931 to date with Bridge Dept., California Div. of Highways, since March 1941 as Asst. Bridge Engr.

TINSLEY, GARLAND SUMNER, McKinney, Tex. (Age 37) (RCA 8.6) Jan. 1946 to date member of firm, Luce, Pape & Tinsley Eng. Co., McKinney, Tex., May 1942 to Dec. 1945 with CEC USN, finally as Lieut. Comdr.; previously with Mott Smith Corp., Houston, Tex.

XAVIER, JULIO FRANCIS, JR. (Junior), Bristol, R.I. (Age 36) (RCA 6.9 RCM 0.8) Dec. 1945 to date Asst. Eng. Aide (hydraulics), U.S. Engr. Dept., Providence, R.I.; previously with U.S. Corps of Engrs., finally as Lt. Col., being Bn. Comdr.

APPLYING FOR AFFILIATE

CRANFORD, DUNCAN, Brooklyn, N.Y. (Age 43) (RC 21.0) 1925 to date with Frederic L. Cranford, Inc., at present as Vice-Pres.

LUCY, JAMES JOSEPH, West Hempstead, N.Y. (Age 47) (RCA 26.4) Oct. 1937 to date private business as Gen. Agent, Maryland Casualty Co.

APPLYING FOR JUNIOR

BOTERO-HOYOS, ARTURO, New York City. (Age 30) Jan. 1945 to date with Parsons, Brinckerhoff, Hogan & MacDonald, New York City; previously Engr., Central Hidroelectrica de Caldas; Asst. Dir. Fomente Municipal, Dept. de Caldas, Manizales, Colombia; with Parsons, Klapp, Brinckerhoff & Douglas, New York City.

CARSTENS, MARION ROBERT, Iowa City, Iowa. (Age 26) Nov. 1945 to date graduate student,

Douglas Fir Plywood Again Allocated

-To Meet the Urgent Needs of the Reconversion Housing Program

TODAY'S most urgent and immediate need is for housing—and the Douglas fir plywood industry pledges complete cooperation with the Reconversion Housing Program.

The demand for housing requires that Douglas fir plywood again be put on an allocation basis. This means that a substantial proportion of the industry's production will be channelled to housing contractors, stock cabinet manufacturers, prefabricators and distributors.

As a result, the present supply situation for all other industrial and construction uses will be temporarily aggravated.

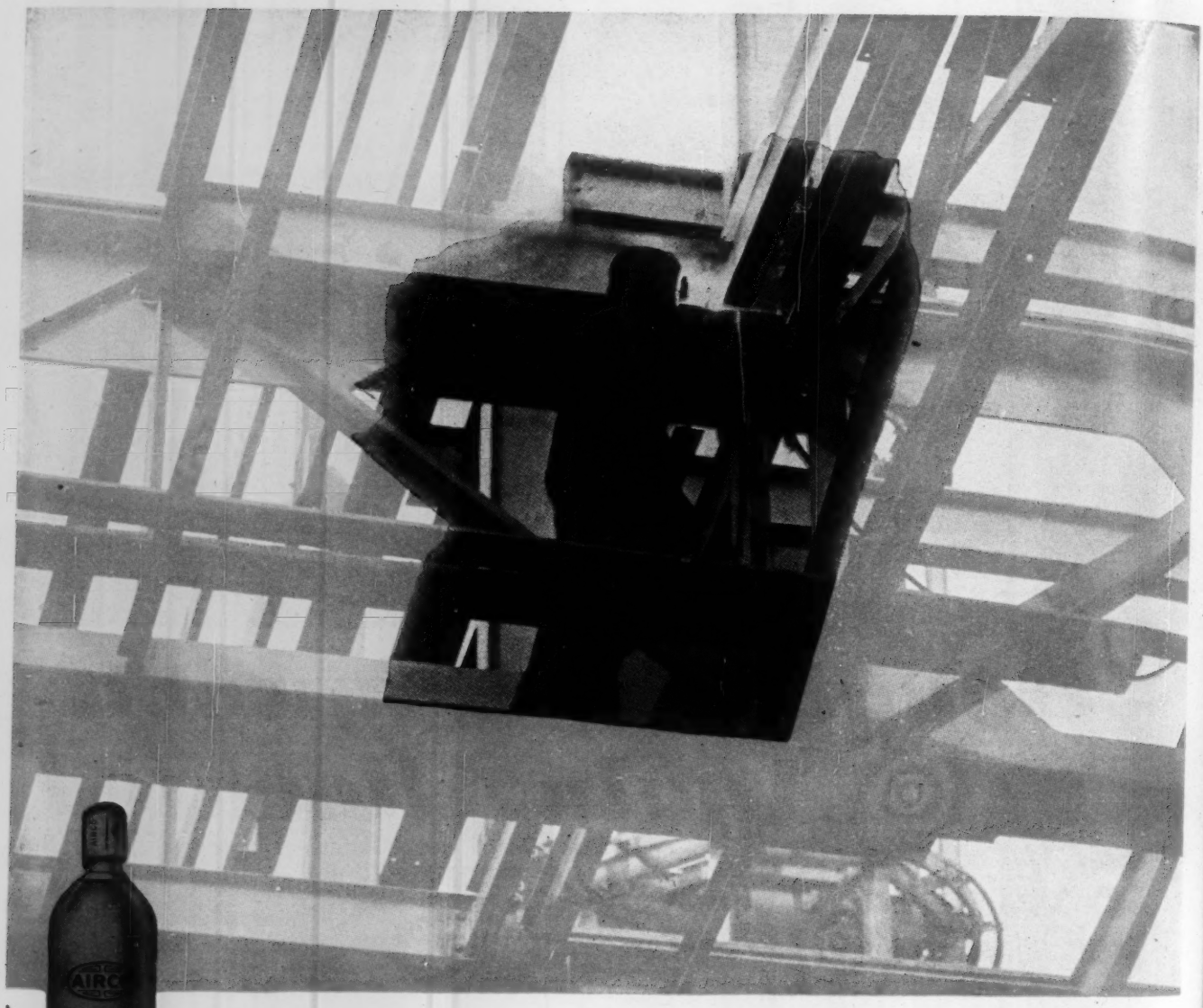
May we strongly urge you to anticipate your needs *far in advance*—and discuss your requirements with your regular sources of supply.

Even though today the supply situation in Douglas fir plywood is critically short, for many projects such as forming concrete surfaces, for signs and display work, for boat building, and for many other industrial and commercial uses, it is almost indispensable. In these cases it is well worth waiting for, as it will save time and labor and do a better job.

DOUGLAS FIR PLYWOOD
LARGE. LIGHT. STRONG.
Real Wood PANELS

Douglas Fir Plywood Association
Tacoma 2, Washington

Airco Processes Save



PRE-WAR born . . . and PROVED, welded construction with Airco oxy-acetylene flame and electric arc methods is today's answer to tomorrow's building boom. These modern methods are more economical . . . save material . . . reduce or eliminate rivet punching and drilling costs . . . speed erection . . . cut heavy handling operations. Further, it has been proved that welded construction saves 10% to 15% in steel through elimination of overlapping joints and reduction in weight of members.

The services of Airco's Technical Sales Division are at your disposal for consultation on the use of any of Airco's modern construction processes. An interesting free booklet: "Oxygen — Indispensable Servant of Industry" is available. Send for your free copy today.

Structural Welding appeals strongly to architects and construction men . . . for not only does it speed up work—save time, steel, weight and money; but it permits greater freedom of design . . . facilitates remodeling . . . makes additions easier and simpler to handle.

CE

AIR REDUCTION
60 EAST 42nd STREET
NEW YORK 17, N. Y.

Please send me the following material:

.....

.....

.....

FIRM_____

NAME_____

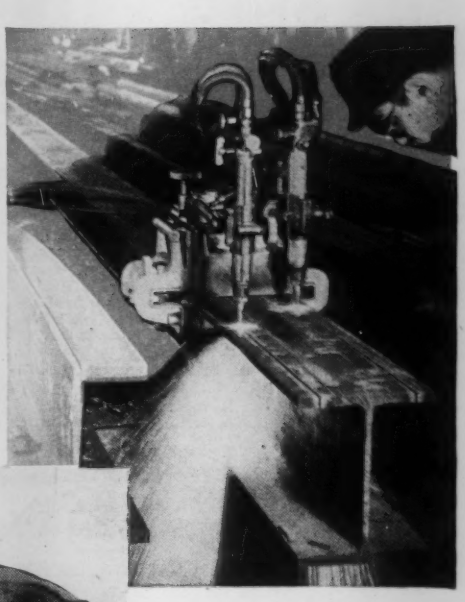
ADDRESS_____

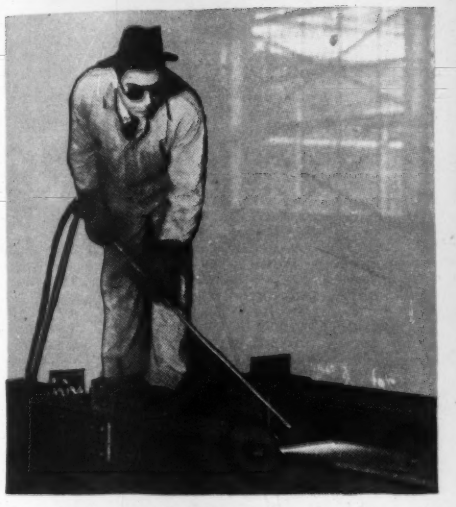
CITY_____ ZONE____ STATE_____

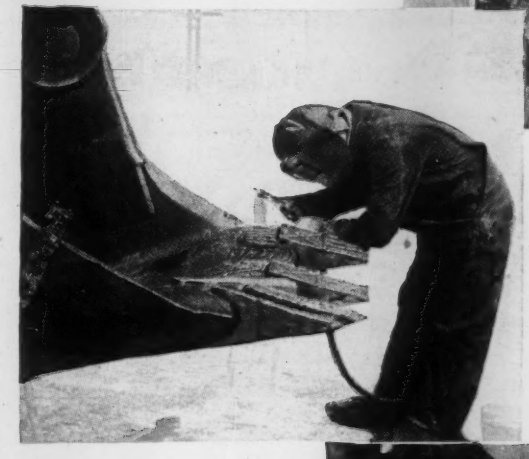
Construction Time . . . Money

Silbrazing Copper and Brass Pipe — threadless, modern joints — made by this process — won't creep or pull apart under any force which the pipe itself can withstand. They remain tight and leak-proof under punishment far greater than that met in normal service. For further information, send for bulletin ADG-2017.

Machine Gas Cutting "I" beams with an Airco Radiagraph permits faster, more convenient steel trimming of standard sizes to fit plan or design requirements. Small wonder, then, that this Airco development has met with such enthusiasm. For further information, send for bulletins: ADC 614 and 627.

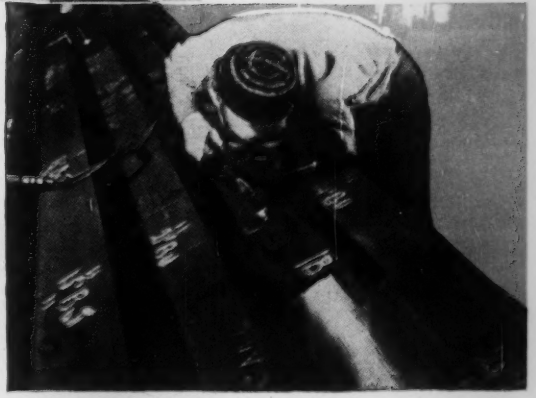


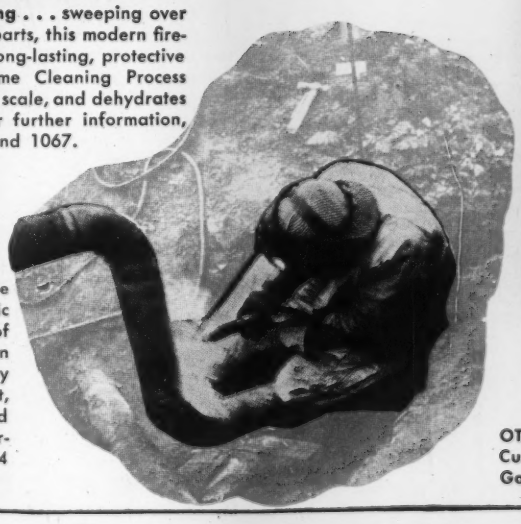




Hardfacing dipper teeth is the standard method of contractors for reducing excessive shovel maintenance. This economical Airco process provides a surface which absorbs the brunt of wear, and reduces abrasion on the parent metal.

Flame Cleaning and Dehydrating . . . sweeping over metal structures and structural parts, this modern fire-broom prepares surfaces for a long-lasting, protective coat of paint. The Airco Flame Cleaning Process permits easy removal of rust and scale, and dehydrates metal surfaces as it cleans. For further information, send for bulletins: ADG-1066 and 1067.





Pipe Welding with either the oxyacetylene flame or the electric arc is an established method of making strong, lasting joints in piping of every type. Welds by either method assure permanent, leakproof piping in interior and outdoor lines. For further information, send for bulletins: ADR-4 and 28.

Hand Cutting with the oxyacetylene flame trims steel to fit, faster than ever before. It permits quick trimming of beams and girders, beveling of plate edges before welding, and many other jobs.

OTHER AIRCO PROCESSES INCLUDE: Braze Welding, Scrap Cutting, Underwater Cutting, Plate Edge Preparation, Flame Gouging, Rivet Washing, Flame Straightening and Bending

AIR REDUCTION

AIRCO

General Offices • 60 East 42nd Street, New York 17, N. Y.

In Texas • Magnolia Airco Gas Products Co. • General Offices • Houston 1, Texas

Offices in All Principal Cities

Represented Internationally By Airco Export Corporation

State Univ. of Iowa; previously with U.S. Army as Platoon Comdr., Co. Comdr., Plans and Operations Officer, Combat Engr. Bn.

CROUCH, DOROTHY ELIZABETH (Miss), Fort Worth, Tex. (Age 27) 1943 to date Jun. Civ. Engr., CAA.

DOMINGO, FRANCIS JULIAN, Topeka, Kans. (Age 25) Sept. 1942 to Nov. 1945, overseas with 115th Engr. Combat Bn.

HASSELBAD, LEONARD OSCAR, Martinsville, Va. (Age 30) July 1942 to date with E. I. du Pont de Nemours & Co., since Sept. 1945 as Planning and Scheduling, Methods Improvement and Office Engr.

HENAGER, WILLIAM FRANKLIN, JR., Tacoma, Wash. (Age 21) Jan. 1945 to date Jun. Engr., Water Resources Branch, U.S. Geological Survey.

MARK, ALIANAK CARMONA HENRY, Rosario De Santa Fe, Argentina. (Age 31) (RCA 4.7) March 1940 to date Engr., Prin. Engr., Santa Fe Highway Dept.; Prin. Engr., Res. Inspector, Chief Engr., Constr. Engr. and Design Engr., at present studying at Columbia Univ., under award of Argentine Soc. for Scientific Progress.

MILLS, KENNETH ELLIOTT, Washington, R.I. (Age 24) (RCA 1.0) Oct. 1945 to date Instrumentman, Rhode Island Dept. of Public Works; previously with Corps of Engrs., U.S. Army.

ROWE, ROBERT SEAMAN, Princeton, N.J. (Age 26) March 1946 to date, Instructor, Princeton Univ.; previously with U.S. Army.

WINGER, RAY JOHN JR., Hot Springs, S.Dak. (Age 27) June 1941 to Jan. 1942 and Jan. 1946 to date Engr. P-1, Bureau of Reclamation, since Jan. 1946 on Angustora Unit, Missouri Basin Project; previously Officer, U.S. Marines.

1944 GRADUATE

UNIV. OF COLO.
(B.S. in C.E.)

	AGE
WIGAND, ROBERT CHARLES, JR.	(21)

1945 GRADUATES

COLUMBIA UNIV.
(B.S. in C.E.)

BLYSTONE, STANLEY EDWARD	(20)
GILDAY, JOHN FRANCIS	(21)

UNIV. OF SO. CALIF.
(B.S. in C.E.)

BOUGHTON, NEWELL ELLSWORTH, JR.	(20)

CORNELL UNIV.
(B.S. in C.E.)

TORREGROSA, MIGUEL	(24)

1946 GRADUATES

UNIV. OF ARIZ.
(B.S. in C.E.)

WALSER, PAUL L.	(31)

CALIF. INST. TECH.
(B.S. in C.E.)

BENTON, PHILIP HENKING	(20)
JESSEN, HOWARD ELLSWORTH	(20)
MCCARTHY, JAMES LEE	(20)

CLEMSON A & M COLL.
(B.S. in C.E.)

WATSON, ROBERT GILES	(23)

DARTMOUTH COLL.
(B.S. in C.E.)

ANTHONY, JOHN JASON	(21)

UNIV. OF KANS.
(B.S. in C.E.)

KELLER, CHARLES WALTER, IV	(20)
PRESTON, KENNETH AL	(20)

PURDUE UNIV.
(B.S. in C.E.)

BECHTEL, STEPHEN DAVISON, JR.	(20)
DAVIS, FRANKLIN NELSON	(21)
FOWLER, MELVIN LEO	(21)
MERRILL, JOHN EUGENE	(25)
ROUSE, ROBERT DONALD	(22)

UNIV. OF SO. CALIF.
(B.S. in C.E.)

SALVADOR, ANTONIO FERNANDEZ	(25)

VA. MI. INST.
(B.S. in C.E.)

MORGAN, JAMES MARKUS, JR.	(22)

VA. POL. INST.
(B.S.C.E.)

MCLAUGHLIN, ALEXANDER CHARLES JOHN	(20)

The Board of Direction will consider the applications in this list not less than thirty days after the date of issue.

RECENT BOOKS

New books donated by the publishers and filed in the Engineering Societies Library, or in the Society's Reading Room. Notes regarding books are taken from the books themselves, edited by the staff of the Society or of the Library. Books in the Library may be borrowed by mail by Society members for a small handling charge.

(THE) AUTOBIOGRAPHY OF SCIENCE. Edited by F. R. Moulton and J. J. Schifferes. Doubleday, Doran and Company, Inc., Garden City (N.Y.), 1945. 666 pp., tables, 8½ × 5¼ in., cloth, $4. From the earliest records to the twentieth century, the great triumphs of science, in all fields, are recorded in this volume in the original words of those who achieved them. The introductory notes by the authors immediately preceding the separate items provide brief information about the lives, activities, and achievements of the men whose writings are presented. This unusual collection will be of interest to those who like their information first-hand, allowing for the necessity of translation from foreign languages.

BUILDING AN ENGINEERING CAREER, 2 ed. By C. C. Williams. McGraw-Hill Book Co., New York and London, 1946. 309 pp., illus., diagrs., charts, tables, 8¼ × 5½ in., cloth, $2.50. An orientation course for freshman engineers. The author discusses what engineering is and how to study it, gives something of its historical background, and calls attention to modern achievements. This edition has been revised.

(THE) BUILDING OF THE BURMA ROAD. By Tan Pei-Ying. McGraw-Hill Book Co. (Whittlesey House Division), New York, 1945. 200 pp., illus., tables, maps, 8¼ × 5 in., cloth, $2.75. The story of the building of the Burma Road is told by the man who directed its construction from the beginning until the retreat of the Chinese armies from Burma in 1942. It is an unconventional account of a remarkable work, carried out without equipment or trained personnel.

(THE) DEVELOPMENT OF MATHEMATICS. By E. T. Bell. McGraw-Hill Book Co., New York and London, 1945. 637 pp., 9 × 5¾ in., cloth, $5. Although this book covers the evolution of mathematics from about 4000 B.C. to the present day, it is not strictly a history. The author's intent is rather to indicate main trends over this period, presenting them only through typical major episodes in each. Chief principles, methods, and theories are considered in both pure and applied mathematics. The author clearly shows by the judicious use of technicalities how seemingly unimportant phases have been developed into tremendously useful lines of endeavor.

ELEMENTARY MECHANICS OF FLUIDS. By H. Rouse. John Wiley & Sons, New York; Chapman & Hall, London, 1946. 376 pp., illus., diagrs., charts, tables, 9¼ × 5¾ in., cloth, $4. The author considers the mechanics of fluids to be as fundamental a treatment of fluid behavior as the mechanics of solids is of the behavior of rigid and elastic bodies, and develops flow principles from the basic equations of mechanics in a logical, systematic order. He describes the practical application of these principles to problems encountered in various phases of engineering endeavor, with many illustrative examples. The problems are designed to further the student's own power of analysis.

INGENIÖRS VETENSKAPS AKADEMIEN, Handlingar Nr. 184. On the Deflection Theory of Suspension Bridges. By S. O. Asplund. Ingeniörs Vetenskaps Akademien, Stockholm, Sweden, 1945. 201 pp., illus., diagrs., charts, tables, 9¾ × 7 in., paper, apply. This paper treats of the effect of vertical loads upon the main girders of suspension bridges, taking into account the distortions of the system. Solutions of the fundamental differential equation of the deflection theory have been carried out far enough to result in general expressions directly adaptable to influence line use. Applications to one-span and three-span bridges are worked out, and model tests are evaluated by comparison. There is a bibliography.

(THE) MATERIALS HANDLING MANUAL (II). Edited by M. M. Williamson and G. W. Williamson. Paul Elek (Publishers) Ltd., London, E.C. 1, 1945. 488 pp., illus., diagrs., charts, tables, 8¾ × 5½ in., cloth, 30s. This volume deals with aspects of handling applicable to all industries. The material is divided into four main divisions: Continuous bulk movement, mainly horizontal, such as belt conveyors and aerial ropeways; continuous bulk movement, mainly vertical, as with elevators and pneumatic handling; continuous package handling, horizontal and vertical; intermittent movement, as earth moving, hoists and trucks.

PHOTOGRAPHY IN ENGINEERING. By C. H. S. Tupholme. Faber and Faber Limited and the Hyperion Press Limited, London, 1945. 276 pp., illus., diagrs., charts, 9½ × 7 in., cloth, 42s. The ways in which the camera is being used to simplify the draftsman's work, to analyze raw materials, to make records of high-speed machinery, in studying the molecular structure of metals, etc., are presented in this volume, which conveniently summarizes much scattered literature. Bibliographies provide for further study.

RADAR, WHAT RADAR IS AND HOW IT WORKS. By O. E. Dunlap, Jr. Harper & Brothers, New York and London, 1946. 208 pp., illus., diagrs., 8¼ × 5¼ in., cloth, $2.50. Written for the layman, this book traces the history of radar from the early reflected wave experiments of Hertz and Marconi, and presents a simple explanation of its basic features. The range and likely worth of various peacetime applications are considered, and a glossary and bibliography are appended.

SEQUENTIAL ANALYSIS IN INSPECTION AND EXPERIMENTATION. Revised and enlarged edition, prepared by the Statistical Research Group, Columbia University, for the Applied Mathematics Panel, National Defense Research Committee, Office of Scientific Research and Development; publ. by Columbia University Press, New York, 1945. Paged in sections, diagrs., charts, tables, 11½ × 10 in., lithoprinted, loose leaf, fabrikoid binder, $6.25. Section I of this work discusses the general theory of the method as applied to inspection and experimentation. Sections II to VI, inclusive, describe the practical operation of the system under varying conditions and for various purposes. Some of the properties and fundamental mathematical principles of sequential analysis are explained in the appendixes which occupy the last section. The several sections are bound in separate pamphlet form and contained in a ring binder for easier separate use.

SIMPLIFIED ARCHITECTURAL DRAWING with Examples and Graded Problems. By T. C. Buss. American Technical Society, Chicago, 1946. 258 pp., illus., diagrs., tables, 11¼ × 8 in., cloth, $4.75. Intended to bridge the gap between mechanical drawing and architectural design, this volume begins with a section on drafting technique, and a brief history of architectural styles. The second section—on working drawings, detailing, and construction—includes chapters on engineering drafting and on specifications, contracts, and estimating. The third section demonstrates display drawing, mechanical and freehand sketching. A representative group of problems is appended.

TABLES OF FUNCTIONS WITH FORMULAE AND CURVES (Funktionentafeln mit Formeln und Kurven), 4 ed. By E. Jahnke und F. Emde. Dover Publications, New York, 1945. 306 pp. + 76 pp., diagrs., charts, tables, 9 × 5½ in., cloth, $3.75. This collection of tables has again been reprinted, with many errors corrected and a supplementary bibliography. These changes increase the value of the book, making it the most comprehensive in its field.

(A) TREATISE ON APPLIED HYDRAULICS, 3 ed., revised and enlarged. By H. Addison. John Wiley & Sons, New York; Chapman & Hall, London, 1945. 614 pp., illus., diagrs., charts, tables, 8½ × 5¼ in., cloth, $6.50. The purpose of this book is to present a compact summary of the fundamental principles of hydraulics and of the manner in which they are applied by the engineer. Particular attention has been given to the following topics: Frictional loss in closed and open conduits; pressure and thrust on immersed solids; water-hammer in pipes; and pressure distribution on pump and turbine blades. There is a bibliography divided by chapters.

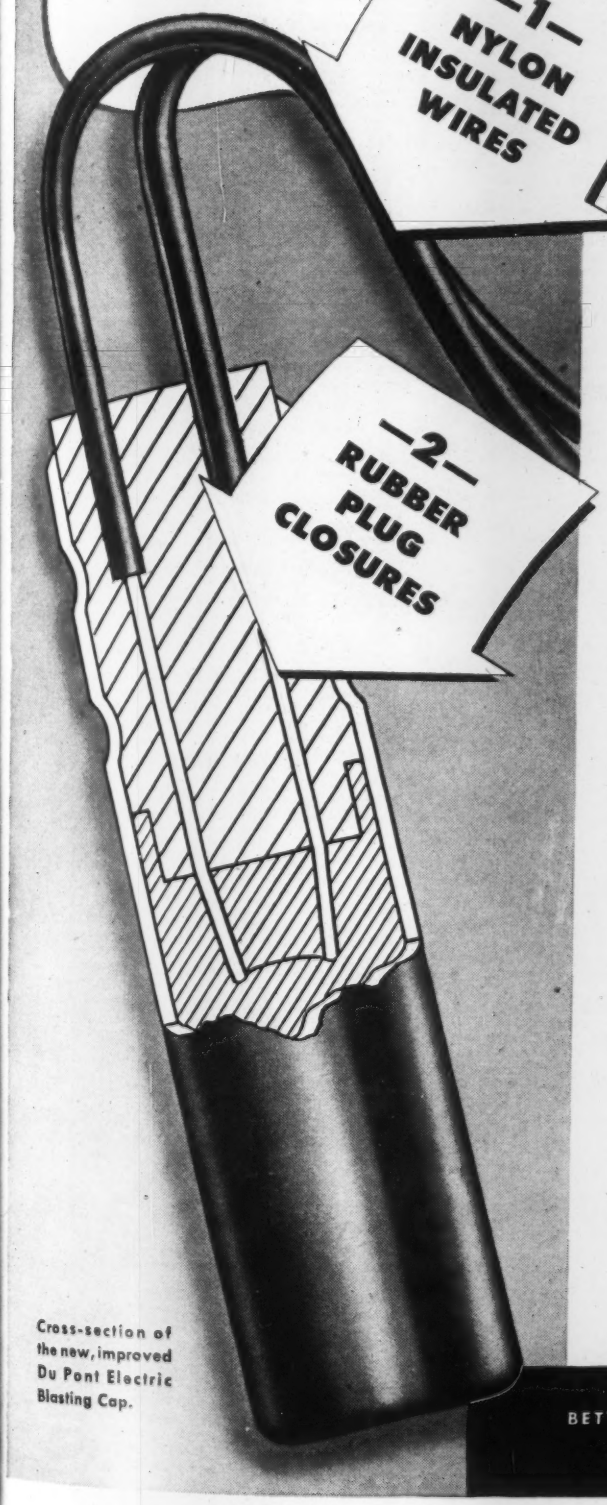
UNIFORM BUILDING CODE, 1946 Edition. Adopted by the Pacific Coast Building Officials Conference with Revisions and Additions to September 1945. Pacific Coast Building Officials Conference, Los Angeles (Calif.), 1946. 312 pp., tables, maps, 7¾ × 5½ in., paper $2.50 ($3 cloth). Since the last edition appeared in 1943, this code has been extensively revised and new material added. The section on administration has been entirely rewritten, and the chapter on masonry completely revised. Other additions include a chapter on prefabricated construction and new sections on glued construction.

WATER SUPPLY AND PURIFICATION, 2 ed. By W. A. Hardenbergh. International Textbook Co., Scranton (Pa.), 1945. 488 pp., illus., diagrs., charts, tables, 8½ × 5¼ in., cloth, $4. The theories underlying the collection, transportation, delivery, and treatment of water are presented, including the determination of quantity of water available, pipe-line calculations, design of distribution systems, and purification processes. Actual problems are used for illustrative purposes to bridge the gap between theory and practice. This second edition includes material concerning developments in water supply problems resulting from the war.

These 2 Exclusive Features Make

DU PONT ELECTRIC BLASTING CAPS

Safer...



Cross-section of the new, improved Du Pont Electric Blasting Cap.

The possibilities of dangerous and costly misfires are cut to a minimum when Du Pont Instantaneous and Delay Electric Blasting Caps are used. Two exclusive features—Nylon-insulated Wires and Rubber Plug Closures—provide added safety measures.

Check the advantages of these features:

LESS CURRENT LEAKAGE—tough, nylon-insulated wires resist abrasion; are equal to enamel in preventing current leakage.

INSULATION READILY REMOVED—nylon-plastic insulation can be easily removed when making connections.

UNAFFECTED BY TEMPERATURE CHANGES—sudden changes in temperature have no effect on the nylon-plastic insulation.

FEWER ERRORS IN HOOKING UP—brilliant colored nylon insulation makes leg wires easy to see . . . assures quick accurate hook ups.

MAXIMUM WATER RESISTANCE—double-crimped rubber plug closures provide maximum water resistance . . . are unaffected by extreme temperatures.

EASIER, SAFER, PRIMING—rubber plug closures permit using cap shells from ½" to 1⅝" shorter. Explosive strength is the same as old-type caps.

Ask your Du Pont Explosives Representative to show you Du Pont Electric Blasting Caps. Use them! You'll find them dependable, safer detonators.

E. I. DU PONT DE NEMOURS & CO. (INC.)
EXPLOSIVES DEPARTMENT
WILMINGTON 98, DELAWARE

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT
REG. U. S. PAT. OFF.

Engineering Societies Personnel Service, Inc.

NEW YORK 8 W. 40TH ST. | CHICAGO 211 W. WACKER DR. | DETROIT 100 FARNSWORTH AVE. | SAN FRANCISCO 57 POST ST.

The items listed below have been furnished by the Engineering Societies Personnel Service, Inc., which is under the joint management of the Four Founder Societies. This service is available to members and is operated on a cooperative, non-profit basis. In applying for positions advertised by the Service the applicant agrees, if actually placed in a position through the Service as a result of these advertisements, to pay a placement fee in accordance with the rates as listed by the Service. These rates have been established in order to maintain an efficient non-profit personnel service and are available upon request. This also applies to registrants whose notices are placed in these columns. All replies should be addressed to the key numbers indicated and mailed to the New York Office.

A weekly bulletin of engineering positions open is available to members of the cooperating societies at a subscription of $3 per quarter or $10 per annum, payable in advance.

ENGINEERS WANTED FOR GOVERNMENT SERVICE IN GERMANY

QUALIFIED engineers, technical experts and industrial operating and research personnel representing industry, utility and manufacturing activities are needed for investigation and reports and for searching German documentary material in Germany.

Technically competent men are needed in the following fields: utilities—steam, electric and hydroelectric central stations, transmission lines and appurtenant installations, water supply, pipe lines, sewage disposal methods and equipment; metallurgy, metals and minerals; foods; aeronautics; chemistry and related industries; automotive industries; machine tools and general industrial equipment; fuels and lubricants; communications equipment; scientific instruments; shipbuilding; and textiles.

Duration of employment is six months to two years. Salaries range from $3,740 to $5,180 a year, plus living expenses within established allowances and necessary traveling expenses.

Also needed are several men highly trained and thoroughly experienced from a technical and operating point of view in one or more of the activities listed above, for inspection, investigation, supervision, and preparation of reports. Salaries are $7,175 a year.

All applicants must have ability in reading and speaking technical German.

Apply to Engineering Societies Personnel Service, Inc., key number W-6950.

WANTED

Civil Engineer, Architect or equivalent experience, capable of practical application and original thinking for research on building material uses in Research and Development Department of progressive expanding organization, producing building materials. New York Metropolitan area.

Send résumé to

Box Number 1616
%Civil Engineering
33 West 39th Street
New York 18, N. Y.

MEN AVAILABLE

INSTRUCTOR OR ASSISTANT PROFESSOR; Assoc. M. ASCE; B.S. in C.E., Johns Hopkins. Until recently was assistant professor of engineering at Western University; 12 years' experience teaching descriptive geometry and engineering drawing; 8 years in industry. Outstanding personality and record. Location preferred, California or West. Available immediately. C-276.

CONSTRUCTION SUPERINTENDENT ON SMALL PROJECTS; Jun. ASCE; graduate civil engineer; assistant construction superintendent on large projects or as field engineer on heavy construction; 7 years' general construction experience, including waterfront construction, roads, airfields, steel erection, buildings (two years of above spent overseas on advance bases with Seabees (Lt.) on all types of construction); 2 years as mechanical engineer. C-277.

ASSISTANT PROFESSOR OF CIVIL ENGINEERING; Assoc. M. ASCE; 33; former Seabee; Master's degree; in C.E.; 11 years' experience in building construction, highways, pipe line, and all phases of surveying; desires position teaching. Available in summer. C-278.

ENGINEER; Jun. ASCE; age 27; married; B.S. in C.E.; major, AC (ORC); 6 months, experience with State Highway Department; 4½ years with Air Corps as A/C Engineering and Maintenance Officer. Desire position with construction firm in field or highway construction. Location, east of Mississippi, preferably Ohio. Available immediately. C-279.

CIVIL ENGINEER; Jun. ASCE; 22; married; B.S. in C.E., Cornell University, 1945; specialization in sanitary engineering; 6 months' experience in transportation field as ensign, CEC, U.S.N.R. Desire position with sanitary engineering firm or in transportation field near New York City. Expect discharge approximately July 1, 1946. C-280.

CIVIL ENGINEER; Jun. ASCE; age 32; graduate of Pennsylvania State College; 5½ years structural detailing and design in shipyard; 8 months surveying and drafting with consulting engineer and contractor; 1 year on maintenance work with public utility. Desire position as detailer, designer, and estimater, preferably with sanitary consultant, contractor, or municipality. Available immediately. C-281.

CIVIL ENGINEER; Jun. ASCE, age 26; married; B.S.C.E., 1942; discharged Army Air Corps Officer; 1 year in aircraft design and stress analysis; now doing structural drafting, layouts, and arrangements. Desire a structural design position. Willing to start on board if there is opportunity to advance to design. C-282.

CONSTRUCTION EXECUTIVE; M. ASCE; 45; licensed civil and structural engineer; Lt. Col., Corps of Engineers; 22 years' broad experience on heavy construction; over-all management of the project, including planning, design, purchasing, construction, accounting, personnel; sewage disposal; water supply; airports; port facilities, including heavy dredging; bridges and highways; industrial buildings. Available in June. C-283.

CIVIL ENGINEER; M. ASCE; graduate of Cornell University; 14 years' experience in industrial and power plant development; 6 years in engineering education. Recently in European theater as professor and lecturer for Army. Interested in professional position in civil or administrative engineering or industrial connection in training, personnel, or sales. C-284.

POSITIONS AVAILABLE

DESIGNERS. (*a*) Designing Engineer experienced in designing dams, tunnels, and covered concrete reservoirs. (*b*) Civil Engineers to assist designing and drafting work in connection with preparation of plans and construction drawings for dam, tunnel, covered concrete reservoirs, etc. Write detailed letter, stating experience, age, education, and salary expected, and send references, together with sample of work. Location, Connecticut. W-5600.

CHIEF OF PARTY, civil graduate, who has had experience in the surveying of large tracts of land. Must be qualified to tie in calculations, etc. Knowledge of Spanish desirable. Salary, $3,000–$3,600 a year, plus subsistence and other allowances. Must report single status. Location, Venezuela. W-6795.

CIVIL ENGINEER, not over 45, for promotional field work. Should have a good structural design background. Considerable traveling involved. Salary, $4,000–$4,200 a year, plus traveling expenses. Company will furnish automobile. Location, western New York. W-7014.

DRAFTSMEN AND DESIGNERS. (*a*) Draftsmen for plotting survey notes on roads, streets, and utilities; computing quantities; and progressing to design of structures. (*b*) Designers for design and detail of reinforced concrete and structural steel, especially highway grade-separation structures. Location, Alabama. W-7021.

ASSISTANT PROFESSOR OF CIVIL ENGINEERING; advanced degree and ability to organize course in soil mechanics desirable. Will teach surveying and materials testing. Salary open; extra compensation for summer teaching. Write full details and attach small photograph. Position starts in October 1946. Location, Vermont. W-7045.

ENGINEERS. (*a*) Field Engineer to coordinate engineering work in the field on renovation and new construction work on industrial buildings. (*c*) Structural Engineers with 5 years' experience in building design. (*d*) Specification Writer on industrial buildings. (*e*) Construction Engineer experienced in field work and construction design. (*f*) Construction Engineer experienced in construction work and issuing purchasing orders. Location, New York, N.Y. W-7050.

HEAD OF CIVIL ENGINEERING. Field of specialization not so important as ability to develop department. Special emphasis on preparing graduates for town and city management and for other public service. Living expenses low. Salary, $3,000–$3,400 for school year. Location, Vermont. W-7057.

SANITARY ENGINEER, 30–50, with 5 to 10 years' experience in industrial waste disposal and treatment experience, to clean up stream pollution at various plants, for textile manufacturer. Salary, $5,000–$6,000 a year. Location, New York, N.Y. W-7070.

CIVIL ENGINEER, technical graduate, with a few years' experience in highway and cement construction, to act as service engineer in connection with sales promotion work. Write stating salary desired, education, and experience. Location, upstate New York. W-7082.

INSTRUCTORS AND PROFESSORS. (*a*) Instructors, civil engineering graduates, particularly applied mechanics, strength of materials, surveying, and hydraulics. Positions start July 1946. (*b*) Associate Professor or Professor to take charge of junior courses in structural design, steel, and timber; and probably some senior design. Some experience in building as well as in bridge work, desirable. Position starts in September 1946. Location, Texas. W-7088.

CIVIL ENGINEERS experienced in building construction, for industrial plants and municipal incinerators. Salary open. Location, upstate New York. W-7094.

ENGINEERS, 27–35 preferred, with technical training and cement-manufacturing background. Should have knowledge of drafting and be able to work as plant engineers with the possibility of stepping up to supervisory status. Salary open. Location, Pennsylvania. W-7095.

ENGINEERS for American contracting firm. (*a*) Structural Steel Designers with at least 5 years' design experience in truss work, steel buildings, and allied work. (*b*) Construction Superintendent with at least 5 years' experience on job supervision in industrial building construction. Three-year contracts. Write stating age, experience,

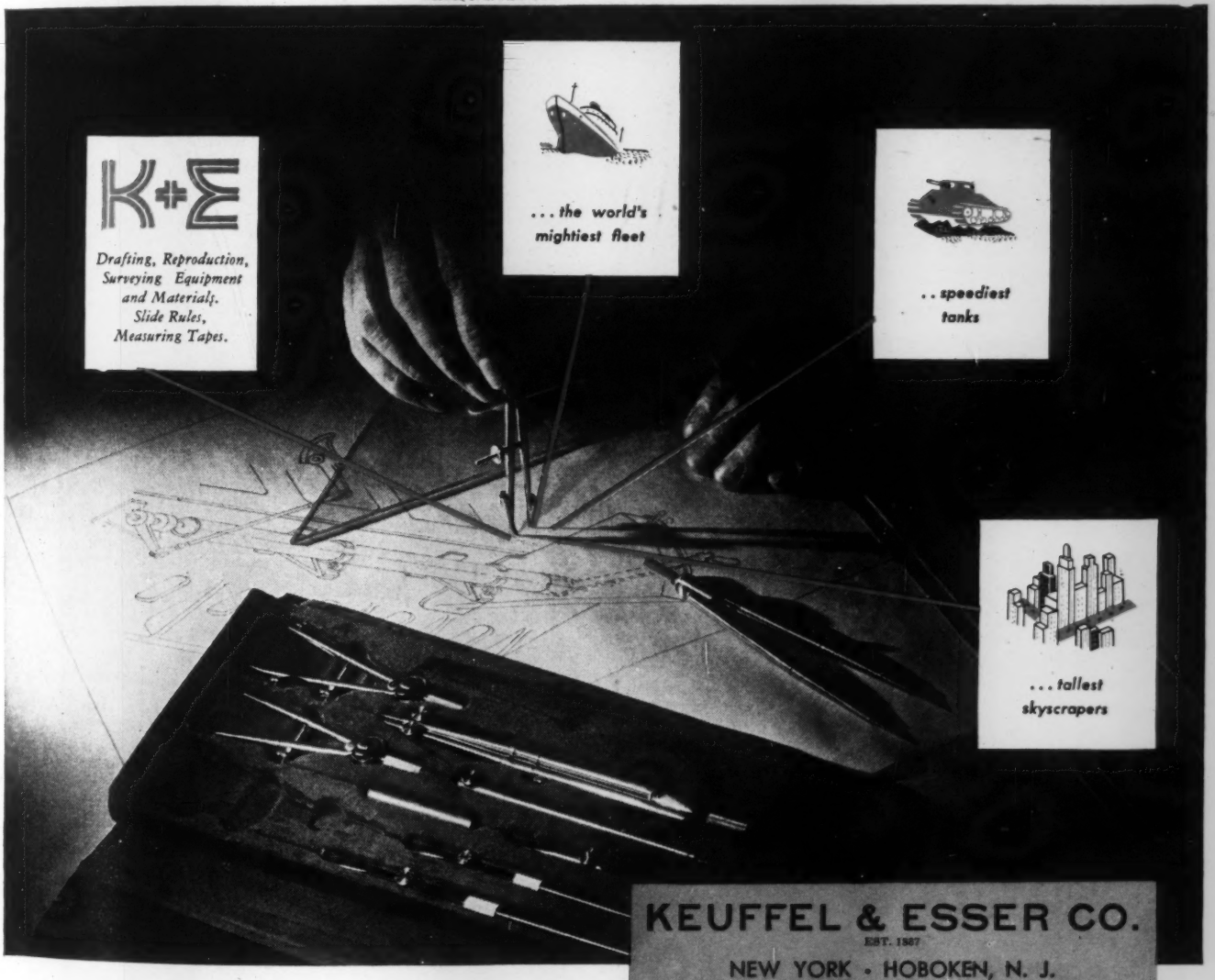
● "The impossible takes a little longer"...this is one way of saying that the draftsman lets no out-worn conceptions restrict his creative ideas. Yet without his specialized technique for expressing ideas on paper, the designs he creates could scarcely be turned into substance. As the draftsman relies on his own hands and eyes, he calls likewise on his drafting instruments to serve him functionally. So integral a part of his technique do they become, they are virtually his partners in creating.

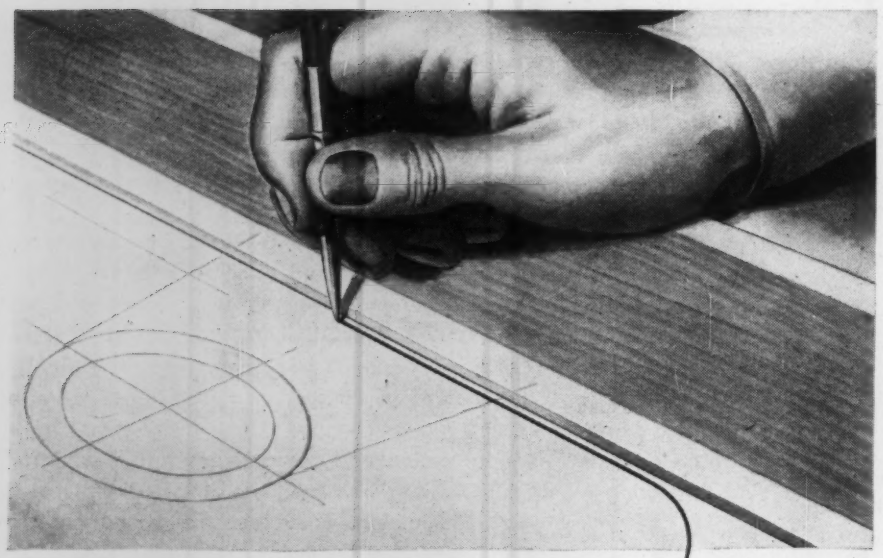
For 78 years Keuffel & Esser Co. drafting equipment and materials have been partners, in this sense, in creating the greatness of America, in making possible our fleets of ships, our skyscrapers, our overwhelming weight of armor on the battlefield...So universally is K & E equipment used, it is self-evident that every engineering project of any magnitude has been completed with the help of K & E. Could you wish any surer guidance than this in the selection of your own "drafting partners"?

Because of their balance, smooth action and responsiveness to your hand, you will find that using MINUSA* Drawing Instruments is almost as natural as breathing. Their legs are round and tapered, without the harsh feel of sharp corners. Joints are firm, snugly fitted, and satin-smooth in operation. Yet these instruments are strong and durable, for their precision will outlast years of continuous use. For complete data on MINUSA* Drawing Instruments, write on your letterhead to Keuffel & Esser Co., Hoboken, N. J.

partners in creating

*REG. U. S. PAT. OFF.


K+E
Drafting, Reproduction, Surveying Equipment and Materials. Slide Rules, Measuring Tapes.
...the world's mightiest fleet
..speediest tanks
...tallest skyscrapers
KEUFFEL & ESSER CO.
EST. 1867
NEW YORK • HOBOKEN, N. J.
CHICAGO • ST. LOUIS • DETROIT • SAN FRANCISCO
LOS ANGELES • MONTREAL



The little line that's all there

When a line is ruled on Arkwright Tracing Cloth, the ink flows like molten lead, and "freezes". It's all there. Make a mile of lines and you'll never strike a place where the cloth refuses to take ink.

This feature of Arkwright Cloths saves time, and time means money.

Arkwright's transparency saves time, too. A draftsman can *see*, easily and accurately. It is permanent, because transparency is achieved by mechanical processing, not by the use of surface oils. It doesn't become opaque with age.

Arkwright's freedom from imperfections saves time, money, and bad tempers. There are no nibs to trip a pen; no dirt, no stains. There are no pin holes, first or last. Repeated erasure never results in a feathered line.

Executives, purchasing agents, and draftsmen; all are interested in saving time, money, or both. To them samples are sent gladly. Write to Arkwright Finishing Company, Providence, R. I.

★

Sold by leading drawing material dealers everywhere

★

Arkwright

TRACING CLOTHS

AMERICA'S STANDARD FOR OVER 20 YEARS

education, family status, and references, and include photograph. Traveling expenses paid. Location, Peru. W-7123.

CIVIL ENGINEERS. (*a*) Soils Engineer for considerable field work for laboratory and field control of construction of earth dams. Residence in Caracas. (*b*) Resident Engineers for earth dam project. Salaries: (*a*) open; (*b*) $6,000 a year, plus $194 month subsistence. Location, Venezuela. W-7126.

CIVIL OR ARCHITECTURAL ENGINEER—graduate, with at least 5 years' experience in design of reinforced concrete slabs and arches, to do drafting on general industrial building construction and preparation of specifications, etc. Salary, $3,900–$5,200 a year. Location, New York, N.Y. W-7133.

GEODETIC ENGINEER, single preferred, civil graduate. Must have had experience in astronomic observation and computation, and be able to lay out geodetic field program of several parties. Salary open. Location, South America. W-7151.

CONSTRUCTION SUPERINTENDENT, 40–50, with general building construction experience, to take charge of industrial plant project. Salary, $6,000 a year. Location, northern New Jersey. W-7159 (*b*).

STRUCTURAL DESIGNERS AND DRAFTSMEN for established firm of consulting engineers. Experience required on steel and concrete bridges. Permanent positions for qualified men. Write giving full details of education and experience. Location, New York, N.Y. W-7200.

Current Periodical Literature

Abstracts of articles on civil engineering subjects from publications (except those of the American Society of Civil Engineers) in this country and foreign lands. The articles indexed are on file in the Engineering Societies Library, 29 West 39th Street, New York, N. Y. Photoprints will be supplied by this Library at the cost of reproduction, 25 cents per page to members of the Founder Societies (30 cents to all others), plus postage, or technical translations of the complete text may be obtained at cost.

PORTS AND MARITIME STRUCTURES

HAMBURG, GERMANY. Port of Hamburg To-Day. *Engineer*, vol. 180, no. 4686, Nov. 2, 1945, pp. 339–342. Illustrated description of condition of port; repair of mine sweepers; account of U-boat building organization of Hamburg, where more than 500 U-boat sections were found and are being cut up into scrap metal.

JETTIES. Big Rock Protects Harbor. *Rock Products*, vol. 48, no. 12, Dec. 1945, pp. 92–95, 136 and 138. Basalt Rock Co. has contract to quarry, transport, and place one million tons of core rock, face rock, and cap rock for jetty at Alameda Naval Air Base; details of project and rock-producing equipment.

LONG BEACH, CALIF. Long Beach Plans Super Harbor, R. R. Shoemaker. *Western Construction News*, vol. 21, no. 1, Jan. 1946, pp. 97–98. Commercial and naval facilities built and planned at Long Beach, Calif., are described; program includes land filling, diking, dredging, land and pier developments, bridge improvements, fire alarm system, sewers, storm drains, warehouses, transit sheds, and other construction.

PIERS, CONSTRUCTION. Cyclopean Pier Construction, K. P. Peel. *Eng. News-Rec.*, vol. 136, no. 8, Feb. 21, 1946, pp. 282–284. Description of Long Beach, Calif., explosives-loading pier project involving wartime shortages; construction features use of concrete pouring forms only for front face of quay wall, placement of quarried stone by floating derricks with wire rope slings, use of prefabricated pile assemblies, and provision for earthquake stresses; cost data.

SHORE PROTECTION. Some Sea Defence Works for Reclaimed Lands, C. H. Dobbie. *Instn. Civ. Engrs.—J.*, vol. 25, no. 4, Feb. 1946, pp. 257–274. 8 supp. plates. Paper deals with sea-defence works carried out by Catchment Boards in southeast England; various types of shore protection are described and illustrated, such as clay walls, revetments, groynes, faggot work; application of pre-cast concrete blocks discussed; plates present examples of actual coasta protection works. Bibliography.

ROADS AND STREETS

HIGHWAY ADMINISTRATION. Economics of Toll Superhighways. *Roads & Bridges*, vol. 84, no. 2, Feb. 1946, pp. 71–76, 94, 96, and 98. Illustrated report on studies made for State of

PIONEERING *in Hydraulics*

If It's Hydraulics~ Put It Up to Us!

SENSING the potentialities of water as a source of power, S. Morgan Smith, our founder, applied his energies to its utilization.

His pioneering effort in the development of one of the early water turbines to be built in the United States ended in success.

Shrewd men adopted the water turbine as a source of power in ever greater numbers. But S. Morgan Smith's pioneering spirit continued—a spirit still manifesting itself in our endless research and experimentation—factors in the future development of POWER!

S·MORGAN SMITH COMPANY
YORK·PENNSYLVANIA·U·S·A·

POWER *by* SMITH

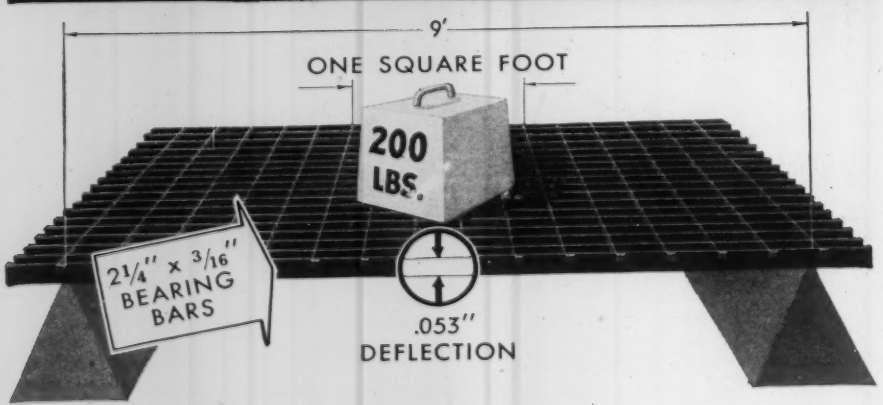
FOUNDATIONS

PRETEST UNDERPINNING
CONCRETE-STEEL PILES
MASS CONCRETE CONSTRUCTION
HEAVY SHORING
DRILLED-IN CAISSONS

Send for catalogs descriptive of the latest foundation types and methods.

SPENCER, WHITE & PRENTIS, INC.
10 EAST 40th ST. NEW YORK 16, N. Y.

This is TRI-LOK
OPEN STEEL FLOORING



The locked in strength of TRI-LOK enables it to stand up under heavy loads—even on long spans. No rivets, bolts or welds are used in its construction, thus, the possibility of loose joints is eliminated. *Write for Bulletin 1140.*

DRAVO CORPORATION
NATIONAL DEPARTMENT
300 Penn Avenue, Pittsburgh 22, Pa.
(Distributor for THE TRI-LOK COMPANY)

DRAVO

Illinois of highways, self-liquidating from toll revenues; subject of studies were three rural and seven urban projects (latter in Chicago area); methods of financing, procedure of collecting rural and urban tolls described; concluding remarks by R. Moses, consultant of New York City.

HIGHWAY SYSTEMS, CALIFORNIA. Angeles Crest Highway, J. O. Gallagher. *Calif. Highways & Pub. Works*, vol. 24, nos. 1 and 2, Jan.-Feb. 1946, pp. 18–19. Illustrated description; data on construction and on difficulties encountered.

HIGHWAY SYSTEMS, CALIFORNIA. Highways of California, J. D. Gallagher. *Calif. Highways & Pub. Works*, vol. 23, nos. 11 and 12, Nov.-Dec. 1945, pp. 5–11. Description of various highways in California; Mt. Palomar Highway; Ridge Route Alternative; Death Valley Roads; Yuma Sand Hills Road.

HIGHWAY SYSTEMS, NEW MEXICO. Atomic Bomb Highway, L. F. Root. *Highway Mag.*, vol. 37, Feb. 1946, pp. 28–31. Illustrated description of Zia Project Access Road, New Mexico, which replaces narrow gravel-surfaced state highway leading to place where atomic bomb was developed and perfected; data on blasts; construction under constant heavy traffic; single and double pipe culverts; construction started Aug. 24, 1943, and was finished by July 22, 1944; total cost, including preliminary engineering, was approximately $65,500 per mile.

HIGHWAY SYSTEMS, PAN-AMERICA. Pan-American Highway—How Much of It Is Open to Travel? M. E. Gilmore. *Eng. News-Rec.*, vol. 136, no. 8, Feb. 21, 1946, pp. 276–281. From Laredo, Tex., Pan-American Highway reaches only some 1,150 miles without gaps, but beyond, extend many broken stretches; progress in Central and South America is described, and specific projects and conditions are detailed for individual countries.

MAINTENANCE AND REPAIR. New Devices Aid in Maintenance Work, C. F. Lind. *Calif. Highways & Pub. Works*, vol. 24, nos. 1 and 2, Jan.-Feb. 1946, pp. 2–5 and 28. Illustrated description of time-saving and labor-saving devices for maintenance and repairs of highways, cleaning of culverts, marking of traffic lines, painting of underside of bridges, etc.

MAINTENANCE AND REPAIR. Renovate Old City Facilities First, W. S. Smith. *Better Roads*, vol. 16, no. 2, Feb. 1946, pp. 29–32 and 34. Recommendations are given for orderly traffic movement and reduction of urban traffic hazards; some of suggestions are well planned and properly maintained pavement markings, pedestrian signals, traffic islands, speed control, parking, loading zones, intersection channelization, adequate turning radii, etc.

OREGON. Oregon Builds Regional Link, F. D. Eason. *Western Construction News*, vol. 21, no. 1, Jan. 1946, pp. 85–88. Description of Steiwer Hill-Albany (Ore.), project for improvement of Pacific Highway (U.S. 99E), with by-pass route on 200-ft right of way that can be extended to 4-lane system in future; contracts awarded, constructional and paving operations, and data on bridge structure and project costs are included.

ROAD MATERIALS, BITUMINOUS. Stability of Bituminous Mixtures as Affected by Properties of Aggregate, B. H. Knight. *Roads & Road Construction*, vol. 24, no. 277, Jan. 1, 1946, pp. 18–21. Study of effect of successive crushing of aggregates used in asphalt mixtures on stability of latter; influence of shape of aggregates, grading, varying crushing force, etc., taken into consideration; tests on degradation of bituminous-coated aggregate at constant temperature, von Rittinger's law of crushing, and correlation of laboratory findings with field observations discussed. Bibliography.

ROCK CRUSHERS. Rock Plant on Road Contract. *Western Construction News*, vol. 21, no. 1, Jan. 1946, pp. 95–96. Brief notes on rock-crushing plant with 50-cu yd hopper, set up near Washington State Highway Route 12 improvement project, to provide ballast aggregate from quarry.

SNOW AND ICE CONTROL. Speedy Cinder-Spreading, F. Reichstein. *Highway Mag.*, vol. 37, Jan. 1946, p. 20. Illustrated description of patented all-weather, sand, cinder, or salt spreader for icy streets, or highways under bad storm conditions.

STABILIZATION. Using Stabilized Soil Mixtures Properly, C. M. Ziegler. *Pub. Works*, vol. 77, no. 2, Feb. 1946, p. 33. Experiences in the use of chemically stabilized mixtures for patching and maintenance of roads in Michigan; precautions in their use stressed. Abstract of paper before Am. Road Bldrs. Assn.

STREET LIGHTING. Street Lighting Important in Post-War, P. Glanzer. *Highway Mag.*, vol. 37, Jan. 1946, pp. 15–16. Relationship between street lighting and traffic accidents revealed by presenting data on accidents during black-out in London and during dim-out in New York and Atlantic seaboard cities; results of tests performed by New York University Center for Safety Education show lowering of driver's vision by dim-out; recommendations given as to efficient street lighting.

WATER — WON THE WEST!

LOCK JOINT CONCRETE CYLINDER PIPE (48" diameter) for the 70-mile San Diego Aqueduct...ready for delivery and installation. Manufactured at the San Diego Plant of the AMERICAN PIPE AND CONSTRUCTION CO.

AMERICAN PIPE AND CONSTRUCTION CO. manufactures and installs:

LOCK JOINT CONCRETE CYLINDER PIPE

PRESTRESSED LOCK JOINT CONCRETE CYLINDER PIPE

AMERICAN CONCRETE CYLINDER PIPE

HUME CENTRIFUGAL CONCRETE PRESSURE PIPE

Concrete Pipe for storm sewers, sanitary sewers, culverts, highway drainage and other uses.

Offices and Plants at Portland, Oregon
Oakland, San Diego and Los Angeles, California

Water — traveling hundreds of miles through pipe lines, canals and conduits, finally swept aside the dead hand of drought barring westward expansion from the days of the early Dons! Millions of gallons of water are now delivered daily to western cities, ranches and rapidly growing western industries through permanent REINFORCED CONCRETE PRESSURE PIPELINES!

For 50 years CONCRETE PIPE in water supply lines has formed important links in the great, permanent water arteries that have finally won the west. Today REINFORCED CONCRETE PRESSURE PIPE in Main Water Supply Lines — under construction and in the design stage — provides dependable service in slaking the thirst of a still growing Western Industrial and Agricultural Empire!

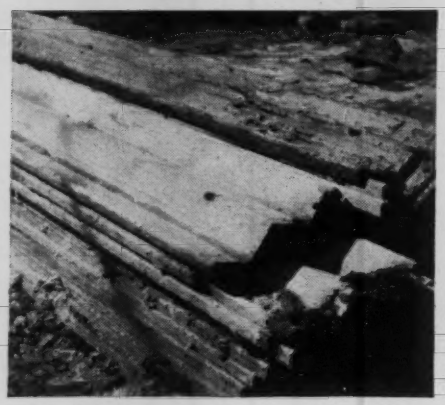
Free from wall-thinning corrosion, tuberculation or electrolytic action, REINFORCED CONCRETE PRESSURE PIPE is truly PERMANENT! Literature and information concerning its many uses in Main Water Supply Lines, Force Mains, Storm and Sanitary Sewers, Culverts and Highway Drainage are available from

American Pipe and Construction Co., P.O. Box 3428, Terminal Annex, Los Angeles 54, Calif.

AMERICAN
PIPE & CONSTRUCTION CO.

LONG-LASTING WATER SUPPLY LINES

THIS SHEETING PAID OFF AT 100 TO 1



This is how engineers cut costs and speeded the trenching work on an extensive sewer construction program. They specified ARMCO Steel Sheeting and reused it more than 100 times.

The small displacement area of ARMCO Sheeting makes it easy to drive — easy to pull. Corrugated design assures ample strength yet keeps weight down to facilitate handling and speed installation. In driving, sections butt together or are held securely in place by continuous interlocking joints that assure correct alignment and practical water-tightness.

You'll find other economies in ARMCO Sheeting too. It is low in first cost because you buy only the exact weight you need. And since the sheeting is nestable it requires comparatively little space for shipment and storage.

Write us for prices and detailed information. Armco Drainage & Metal Products, Inc., and Associated Companies, 2965 Curtis St., Middletown, O.

ARMCO

ARMCO STEEL SHEETING

SUBSOILS. Soil Sampling and Testing for Highways and Airports, R. M. Hardy. *Roads & Bridges*, vol. 84, no. 2, Feb. 1946, pp. 63–66, 113–114, 116, 118, 120, and 122. Illustrated description of tests on loading capacity, behavior under change in moisture content, permeability, and behavior under freezing conditions; Casagrande soil classification for airfield projects; soil characteristics and classification of U.S. Public Roads Administration; determination of moisture content, specific gravity, mechanical analysis, Atterberg limits, consolidation, triaxial compression, shear, etc.

SEWERAGE AND SEWAGE DISPOSAL

EFFLUENTS. Use of Effluent Water in Sewage Treatment Plants, R. Burrell. *Sewage Works J.*, vol. 18, no. 1, Jan. 1945, pp. 104–109. Sewage treatment plant at West Haven, Conn., and its effluent water pumping system described with aid of illustrations; total volume of water saved at this plant estimated at 4 mg per year; initial investment could be repaid by savings within first three years. Before New England Sewage Works Assn.

GRIT CHAMBERS. Experience in Grit Removal and Handling at Racine, Wis., T. T. Hay. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 54–65. Study of operation and effectiveness of grit chambers; consideration is given to hydraulic design, equipment design, and operation; technical details of layout of sewage treatment plant, grit chambers, and grit washing arrangement are described with aid of illustrations; data on grit analyses at different stages compared, and costs of operation, maintenance, and repair during 1944 listed.

INDUSTRIAL WASTES. Effect of Industrial Wastes on Sewage Treatment, C. L. Siebert. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 97–104. Policies and regulations concerning discharge of industrial wastes to public sewer system; characteristics of objectionable industrial wastes are discussed and various types of preliminary treatment considered; routine inspection and tests of efficiency to insure proper operation and maintenance recommended.

MISSOURI. Septic Tanks and Contact Filters to Be Replaced in New Plant, G. C. Boyer. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 82 and 135. Illustrated description of three sewage-treatment plants at Sedalia, Mo., and of planned new plant having capacity of 450,000 gal per day.

SEWAGE FILTERS. Detritus Settlement Possibilities for Small Sewage Works, *Pub. Works*, vol. 77, no. 2, Feb. 1946, pp. 23–24, 36 and 38. Detritus removal by means of "constant velocity detritus channel"; determination of width and depth of channel; use of channels instead of tanks is recommended only if they are at ground level; under favorable conditions, two channels to be used alternately are suggested.

SEWAGE FILTERS, TRICKLING. Trickling Filter and Its Operation, F. W. Jones. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 89–91. Data on historical development presented; various types of trickling filters, their essential parts, and operation described; advantages for small and medium sized communities indicated.

SEWAGE TREATMENT, RESEARCH. Studies of Effect of Change in Order of Percolating Filters for Sewage Treatment, E. V. Mills. *Water & Sewage*, vol. 84, no. 1, Jan. 1946, pp. 18–19, 44–50. Illustrated report of staff of British Dept. of Sci. & Indus. Research on experiments performed at Minworth, Birmingham, with four filters, order of which was changed at certain intervals; results reveal that settled sewage can be treated by alternating double filtration at four times rate at which similar sewage can be treated by single filtration. Bibliography. Before Inst. of Sewage Purification.

SEWAGE TREATMENT, SLUDGE DIGESTION. Efficiency of Elutriation Process, G. C. Laidlaw. *Water & Sewage*, vol. 84, no. 1, Jan. 1946, pp. 24, 38, and 40. Description of elutriation process, whereby digested sludge is diluted with water and settled, thus causing supernatant to carry with it soluble salts such as ammonium bicarbonate; efficiency of process is usually gaged by reduction in soluble alkalinity content of sludge liquor.

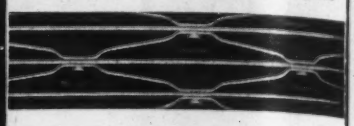
SEWERS, CLEANING. Cleaning Six Miles of Sewer Pipe. *Ry. Eng. & Maintenance*, vol. 42, no. 2, Feb. 1946, pp. 165–166 and 173. When extensive sewerage system serving clearing yard of Belt Railway of Chicago became badly clogged with sand, silt, and other foreign matter it was cleaned with high degree of success, using modern mechanized methods; altogether, about 15,000 lin ft of main sewer pipe and 16,000 ft of laterals were cleaned; article describes methods used and discusses other aspects of work.

SEWERS, DESIGN. Design of Sewers to Facilitate Flow, T. R. Camp. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 3–16. Determination of size of sewers for given slope and peak flow by applying Kutter or Manning equation; alinement chart for flow in pipes; calculation of velocity required to transport sediment is shown with aid of approximate formula while slopes required for self cleansing can be read from charts; effect of sewer transition, non-uniform flow in circular sewers, and sewer junctions explained with aid of charts. Bibliography.

IRVING GRATING

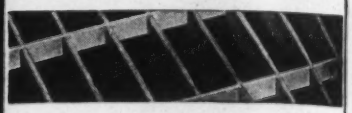
FLOORING AND STAIR TREADS

"A Fitting Grating for Every Purpose"



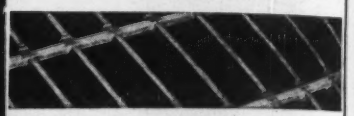
Riveted

Walkways — Stair Steps — Platforms
Trucking Aisles — Trench Covers



Press-Locked

Industrial Plants — Oil Refineries
Chemical Plants — Power Houses
Naval and Merchant Ships
Locomotive, Passenger and Freight Cars



Welded

Catalog for the asking.

IRVING SUBWAY GRATING CO., INC.
ESTABLISHED 1902
HOME OFFICE and PLANT: 5008 27th STREET
LONG ISLAND CITY 1, NEW YORK
WESTERN DIVISION: FOOT OF PARK AVE
EMERYVILLE 8, CALIFORNIA

FOUNDATION
TEST BORINGS

We look into the earth—

anywhere on earth.

An Engineering Service *For* Engineers *By* Engineers

PENNSYLVANIA DRILLING COMPANY
PITTSBURGH, 20, PA.
Complete drilling and grouting service for construction and mining

SLUDGE DIGESTION. Preliminary Greenhouse Studies of Digested Sludge as Fertilizer, H. A. Lunt. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 46–53. Results obtained from use of digested sludge in greenhouse pots and in home garden; charts and tables reveal that immediate increase in crop yields cannot always be expected; however, use of sludge is beneficial, especially to sandy soil; sufficient fertilizer such as potash must be added if satisfactory yields are to be expected. Bibliography. Before New England Sewage Works Assn.

TREATMENT, CHLORINATION. Effect of Heavy Doses of Chlorine in Sewage, A. E. Griffin and N. S. Chamberlin. *Eng. & Contract Rec.*, vol. 59, no. 1, Jan. 1946, pp. 82, 84, 86, 88, 90, and 92–94. Results of laboratory investigations to explore effect of greater than normal additions of chlorine to sewage; series of charts tracing effect of chlorine on samples of raw screened sewage, rapid settler effluent, combined plant effluent, and activated sludge plant effluent; summary and analysis of data. Bibliography.

TREATMENT PLANTS, ANNAPOLIS, MD. Small Sludge Elutriation Plants, A. L. Genter. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 26–45. Economic advantages of sludge elutriation discussed with reference to sewage treatment plant at Annapolis, Md., smallest elutriation layout as to size and cost of equipment; various types of elutriation tanks illustrated and described; sludge conditioning, vacuum filtration, piping, labor, power, and installation discussed. Bibliography. Before New England Sewage Works Assn.

TREATMENT PLANTS, ELIZABETH, N.J. Operation Efficiency and Factors Affecting Operation at Elizabeth Joint Meeting Plant, W. Rudolphs and E. P. Decher. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 66–81. Study of operation records over period of 7½ years; data presented on flow and plant efficiency, comparison of annual rainfall and sewage flow, relation between flow and degree of purification, sewage flow and sludge production, factors affecting sludge barging, effect of temperature, recirculation, sludge concentration, and cost.

TREATMENT PLANTS, EQUIPMENT. Equipment Manufacturers Give Advice on Modernization. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 86, 89–96, 98, 100, 102, 120, 122, and 124. Sewage works manufacturers of United States present illustrated report on modern equipment that may play important part in connection with enlargement, repair, replacement, and modernization of existing sewage treatment works.

TREATMENT PLANTS, ILLINOIS. Modernization and Rehabilitation in Elgin Sanitary District, K. V. Hill. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 83–131. Illustrated description of original works of Sanitary District of Elgin, Ill., their enlargements and proposed additional sludge digestion and sludge storage tanks at estimated costs of $114,000.

TREATMENT PLANTS, MASSACHUSETTS. Elderly Sewage Plant Rejuvenated, E. S. Chase. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, p. 85. Description of proposed modernization of one of oldest sewage treatment works in United States, at Marlboro, Mass.; plans call for grit chamber, tanks, trickling filters, recirculation pumps, etc.

TREATMENT PLANTS, MODERNIZATION. One Quarter of Sewage Plants Need Modernization. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 65–72. Report on national sampling survey undertaken by Sewage Works Engineering concerning repairs, enlargement, and modernization of existing sewage treatment plants; figures reveal great demand of alterations; some 1,500 to 2,000 plants in the U.S. will require major investment of construction funds.

TREATMENT PLANTS, NEW YORK. Town's Growth Makes Necessary Major Plant Improvements, E. S. Ordway. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 78–79. Original plant at Garden City, N.Y., built 41 years ago, was enlarged and improved in 1924 and 1939; further necessary improvements include additional sand bed areas, sludge digestion tank, settling tank, and pumping station; operating data presented; illustrations.

TREATMENT PLANTS, OHIO. Modernizing and Mechanizing Marion, Ohio, Works, F. Browne. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 76–77 and 130. Illustrated description of present treatment plant at Marion, Ohio; placed in operation in 1924, it has deteriorated and become inadequate; in addition to repairing and replacing piping and fixtures, new equipment is needed in order to improve and increase plant efficiency; total costs estimated at $270,000,000.

TREATMENT PLANTS, OHIO. Overloaded Akron Works to Be Enlarged, and Augmented, F. C. Tolles. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 73–75. Growth of industrial life and increase in population at Akron, Ohio, require enlargement of existing sewage treatment plant; description of present plant, treatment effects and proposed improvements; latter include sludge digestion and disposal facilities, activated sludge plant, rehabilitation of present work, and extension of administration and service facilities; estimated costs about $5,000,000; illustrations.

TREATMENT PLANTS, OKLAHOMA. Two Obsolete Works Replaced by Modernized Plant. *Sewage Works Eng.*, vol. 17, no. 2, Feb. 1946, pp. 80–81. Illustrated description of two sewage treatment plants at Duncan, Okla., and proposed changes.

TREATMENT PLANTS, RECORDS. Sewage Plant Records and Operating Reports, L. S. Morgan. *Sewage Works J.*, vol. 18, no. 1, Jan. 1946, pp. 92–97. Data to be included in operation records should refer to pumping station, weather conditions, raw sewage, grit chambers, screen chambers, all kinds of tanks, filters, and chlorination; analytical determination of pH, settleable solids, methylene blue determinations, and residual chlorine determinations should be made daily.

STRUCTURAL ENGINEERING

ALUMINUM ALLOYS, STRUCTURAL. Aluminum Alloys and Their Structural Use, H. K. Hardy and C. G. Watson. *Structural Engr.*, vol. 24, no. 2, Feb. 1946, pp. 65–112. Study of peacetime applications of aluminum alloys; general metallurgical and engineering characteristics; comparison with steel for structures normally regarded as outside usual field of aluminum alloys; study reveals that latter can be used with economic advantage for long-span bridges, suspension bridges, but not for masts and towers; special field for aluminum alloys is in mobile structures such as airplanes, motor cars, railway trucks, and ships.

BEAMS AND GIRDERS, STRESSES. Continuous Beam Analysis by Moment Balance Method, R. J. Cornish. *Structural Engr.*, vol. 24, no. 1 Jan. 1946, pp. 25–41. Method of determining end moments of structural members is described by means of successive approximations made from preliminary estimates; analysis considers prismatic members with transverse loads, with externally applied moments, and with end deflections, as well as members of varying section; application of method to plane building frames as well as to continuous beams is noted.

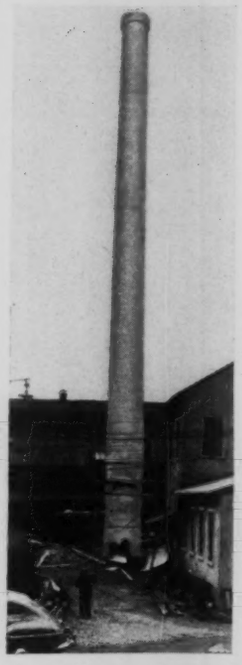
BEAMS AND GIRDERS, STRESSES. Moments Computed Graphically by Australian Method, A. J. Keable. *Eng. News-Rec.*, vol. 136, no. 8, Feb. 21, 1946, pp. 294–296. Detailed explanation of unique method of determining bending moments in simple, fixed-end, and continuous beam problems that obviates need of auxiliary force and ray sketches, and employs principle of

A MATHEWS HYDRANT IS NO SPHINX
A Mathews Hydrant can be turned to face any direction in the compass. This is due to the unique swivel flange at the base of the nozzle section. You simply loosen a few bolts . . . and turn the head with the minimum of labor and expense. And for the same reason, the number and size of the nozzle outlets can be changed by simply changing the head . . . without shutting the water off.
Take a look at the working parts—they are all contained in a removable barrel. In case something goes wrong, you unscrew the barrel from the elbow, lift it out, insert a spare. No digging or excavating; the pavement is intact; life and property are protected with almost no interruption at all; repair costs are held down. Mathews design is noteworthy throughout—oiling from the exterior; operating threads kept free of rust and dirt; frost-proof mechanism; protection case "Sand-Spun" for greater strength, elasticity, freedom from stresses. These and other features explain why there are so many Mathews hydrants in use everywhere in the world.
MATHEWS HYDRANTS
Made by R. D. WOOD Company
PUBLIC LEDGER BUILDING
INDEPENDENCE SQUARE, PHILADELPHIA 5, PA.
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



"GUNITE" FOR ECONOMY IN STACK CONSTRUCTION

During the past twenty years we have built over 200 self-supporting "GUNITE" stacks around old, unsafe existing steel stacks in steel mills, utilizing the old stacks as forms, and doing the work without taking the stacks out of operation.

This use has led us to the development of a new "GUNITE" stack built by using a light prefabricated plywood form made up in short, easily handled sections. After the erection of the plywood form sections a coating of mesh reinforced acid resistant and refractory Lumnite "GUNITE" is applied directly to the form to provide a lining for the new stack. Vertical and horizontal rods and reinforcing mesh are then placed outside the Lumnite "GUNITE" lining, in accordance with conventional design practice, and the structural sand-cement "GUNITE" subsequently applied.

The "GUNITE" stack pictured to the left is 130′ high, with an inside diameter of 6 feet. The "GUNITE" is 12″ thick at the base tapering to 4″ thick at the top. Such a stack, with the advantages of long life and great strength which "GUNITE" gives, costs considerably less than a concrete stack of the same size.

Our bulletin B2300 describes stack work and scores of other uses of "GUNITE."

Write for your copy of bulletin B2300.

MANUFACTURERS OF THE "CEMENT GUN"

LACLEDE

LACLEDE WELDED DOWEL SPACERS

RIGID—ACCURATE

FOR CONTRACTORS, LACLEDE DOWEL SPACERS provide a light weight, economical method of placing dowels and joints. Distribution bars, supports, and dowel sleeves are all welded into one integral unit for rapid joint assembly. Shaped tie wires accurately locate fibre or steel joint materials.

FOR ENGINEERS, LACLEDE DOWEL SPACERS provide a rigid, accurate, prefabricated assembly for holding each end of each dowel in exact location. Both horizontal and vertical alignment of the dowels can be maintained on even the most irregular subgrades within limits prescribed by highway engineers.

LACLEDE STEEL COMPANY

ARCADE BUILDING SAINT LOUIS 1, MISSOURI

cantilever moment; examples of method are included.

PHOTOELASTICITY. Stress Analysis by Photoelastic Method, W. B. Dunn, D. E. Campbell and G. S. Marshall. *New Zealand J. Science & Technology*, (B. Gen. Sec.), vol. 27, no. 2, Sept. 1945, pp. 112–132. Use of photoelastic method for analyzing indeterminate stress problems is presented and possibilities and limitations of method discussed; general principles and construction of laboratory equipment; preparation of model is described, with emphasis on care required in all aspects of operation; photographic technique; necessity of clear photographs to give accurate patterns; illustrative example.

ROOFS, CONCRETE. Concrete Shell Roofs with Flexible Moulds, K. Billig. *Instn. Civ. Engrs.—J.*, vol. 25, no. 3, Jan. 1946, pp. 228–231. Illustrated description of flexible molds consisting of fine and dense jute fabric stretched over steel skeleton and fixed to it so as to form tight skin of exact shape of shell; other type uses high tensile, prestressed wires closely spaced, with fine wire mesh laid over and attached to them; data on costs of shell structures with flexible molds listed in table.

SHIP MODELS, TANKS. Navy's Carderock Model Basin Extended. *Concrete*, vol. 54, no. 2, Feb. 1946, pp. 20 and 24. Illustrated description of Navy's David W. Taylor model basin and its extension at Carderock, Md.; technical data on construction of barrel arch of reinforced concrete 3,000 ft long, 118 ft wide, and its roofing are presented.

STRUCTURAL DESIGN. Floating Block Theory in Structural Analysis, S. U. Benscoter. *Am. Concrete Inst.—J.*, vol. 17, no. 3, Jan. 1946, pp. 205–226. Method of calculating base reaction distribution for several floating blocks attached by hinges presented; author calls it reaction distribution and explains its analogous correspondence to moment distribution; practical application of theory to sewage digestion tank with cross section of single channel is demonstrated.

STRUCTURAL DESIGN. Moment Ratios Simplify Continuity Analysis, F. S. Merritt. *Eng. News-Rec.*, vol. 135, nos. 18 and 20, Nov. 1, 1945, pp. 604–607, Nov. 15, 612–618. Technique of using moment ratios in continuity analysis; application of moment ratios to analysis of continuous building frames; solution of sideway and moving load problems.

TRAFFIC CONTROL

SURVEYS. Origin and Destination Surveys in Urban Areas, J. T. Lynch. *Traffic Eng.*, vol. 15, no. 12, Sept. 1945, pp. 478–482. Condensation of report of Committee on Origin and Destination Survey Techniques, Traffic and Operations Dept., Highway Research Board; studies were designed to inventory nation's highway systems, mile by mile, to find out what services are rendered, who pays for facilities, and to generate factual data on which orderly development of highways in accordance with needs can be charted; methods previously used; new technique developed; other studies under way.

TUNNELS

WATER SUPPLY, LINING. Concreting the Adams Tunnel. *Western Construction News*, vol. 21, no. 1, Jan. 1946, pp. 100–102. Illustrated description of concrete lining project for Alva B. Adams tunnel, carrying irrigation water from Colorado River to North Platte River valley; use of collapsible forms, exterior batching, and "Pumpcrete" mechanical placing is cited as means to speed work.

WATER PIPE LINES

CLEANING. Copper Sulfate for Control of Bacteriological Aftergrowths, F. C. Amsbary, Jr. *Water Works Eng.*, vol. 99, no. 4, Feb. 20, 1946, pp. 182, 194, 196 and 198. Report on successful elimination of growths from pipes and plumbing fixtures in distribution system at Champaign, Ill., by means of copper sulfate; copper should not be applied ahead of filter; most startling experience of copper sulfate treatment was in zeolite softening plant where cleaning of filter proved necessary about once a year while, prior to treatment, filter had to be cleaned 27 times in 1939.

CLEANING. Main-Cleaning, W. Cotton. *Am. Water Works Assn.—J.*, vol. 38, no. 1, Jan. 1946, pp. 45–48. Report of low Hazen-Williams coefficient C of feeder mains led to cleaning most critical mains in Petersburg, Va., in vicinity of Camp Lee; results indicated.

CONSTRUCTION. Maintaining 48-Inch Main Laid Across Swamp, R. Ankener. *Water Works Eng.*, vol. 99, no. 4, Feb. 20, 1946, pp. 174–176, 192, and 194. Illustrated description of 48-in. steel main laid by New York City Water Department across swamp area in 1937; technical details of pipe construction and insulation; main is supported by reinforced concrete beams, stringers, and cradles resting on wooden piles.

MAINTENANCE AND REPAIR. Reconditioning of Rochester Conduit, L. B. Smith. *Am. Water Works Assn.—J.*, vol. 38, no. 1, Jan. 1946, pp. 69–75. Problem of reconditioning abandoned conduit at Rochester, N.Y., in order to meet greatly increased demand.

WATER RESOURCES

UNITED STATES. Developments in Water Supply in 1945, L. N. Thompson. *Water &*

...AND A BIG JOB GETS *all the air it needs*

This story concerns an air compressor used indoors. It tells how a G-E motor enabled the compressor to fit into a very tight space. But it applies equally well to users of air compressors on outdoor construction jobs where portability and ease of handling are important.

Back in 1943, engineers of an eastern industrial concern found that unless they could increase their compressed-air capacity quickly, vital war production was going to fall behind schedule. The problem was—where to put an extra air compressor in a plant already jam-packed with machinery.

There was just one empty corner about 10 by 12 feet in area. A compact high-speed air compressor might be squeezed in. But that left no room for a belt- or shaft-connected drive-motor. The answer was a motor that could be mounted right on the compressor—an unusually compact, close-coupled synchronous motor.

Today, both the compressor and its G-E motor can boast of a perfect three-year performance record, and the combination is still going strong. It has never failed to meet a sudden increase in compressed air demand, and has operated throughout every night shift with no more maintenance than routine inspection and lubrication.

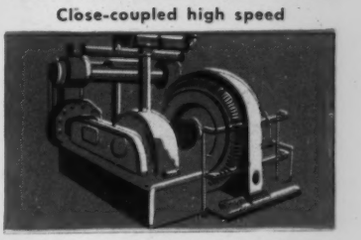
Close-coupled for Economy

G-E close-coupled synchronous motors have won wide acceptance among compressor users in the construction field. Because the rotors are precision fitted directly to the compressor crankshaft, these motors need no outboard bearing or separate foundation. The motor air gap is uniformly and permanently maintained. Installation is simple, too—it is easy to align the motor flange with the compressor frame.

Whether you make compressors or use them, you will be interested in the design and maintenance savings made possible with compact G-E synchronous motors. Write or phone your nearest G-E office. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

G-E SYNCHRONOUS MOTORS FOR COMPRESSORS

Close-coupled high speed



Direct-connected low speed

Belt-connected Tri-Clad

GENERAL ELECTRIC

750-272-8030

WHEN YOU VISIT MODERN MEXICO CITY

In and near Mexico City, you will find many fine, time proven Layne Well Water System installations. A partial tabulation shows Layne Well Water Systems serving Mexico City, an Automobile Assembly Plant, a large Chemical and Pharmaceutical works, Tire and Rubber Companies and extensive Irrigation Projects in the Valley of Mexico adjacent to Mexico City. As in the States — and elsewhere throughout the world — these Mexico installations are giving highly efficient and exceptionally dependable service.

Layne Well Water Systems are designed and built to exceed the usual passable quality mark. Company policy has never been to allow corner cutting in quality or skillful manufacture. Such a policy has made Layne Well Water Systems world famous and given owners immeasurable satisfaction.

If you are in need of a new water system, late literature should be read very carefully. Address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

HIGHEST EFFICIENCY

Layne Vertical Turbine pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves hundreds of dollars on power cost per year.

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Western Co. of Minnesota, Minneapolis, Minn. ★ International Water Supply Ltd., London, Ontario, Canada ★ Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

Sewage Works (formerly *Water Works & Sewerage*), vol. 93, no. 1, Jan. 1946, pp. 1–10. Review of activities of Office of War Utilities (O.W.U.) and A.W.W.A. during war and new thoughts on postwar work; examples of recent plants are illustrated and described; chlorinators and dry feeders at Fayetteville, N. C.; flocculators at Norfolk, Va.; world's largest purification plant for south district of Chicago, Ill.; water treatment plants at Kingsport, Tenn., and at Camp Hann, Calif.; radio and electronics in water works field.

WATER TREATMENT

FLUORINE. Effectiveness of Fluorine in Controlling Dental Caries, H. Klein. *Water & Sewage*, vol. 84, no. 1, Jan. 1946, pp. 17, 40, and 42. Results of study of influence of fluorine on dental caries; analysis of findings leads to conclusion that drinking water containing 3 ppm of fluoride reduces new caries in teeth by 60%; tests were performed with approximately 200 children during 2-year period.

INDUSTRIAL. Proposed Methods for Determination of Dissolved Oxygen in Industrial Waters. *Am. Soc. Testing Mails.—Bul.*, No. 137, Dec. 1945, pp. 19–25. Four test methods described; outline of recent literature on determination of dissolved oxygen presented indicates broad and careful study that has been given to problem since 1930.

SEA WATER, SALT REMOVAL. Low Pressure Evaporators, G. H. Harlan. *Pac. Mar. Rev.*, vol. 43, no. 1, Jan. 1946, pp. 20–23. Water producing and purifying plant discussed occupies total of 3,000 cu ft of space aboard ship; it is sufficient to supply 1,200 troops with water for indefinite length of time on basis of minimum requirement of 5 gal per min per day; typical distilling plant used aboard trans-Pacific troopships throughout war was double effect evaporator of low-pressure type, which distilled average daily output of 80 tons of water; description of distilling plant.

TASTE AND ODOR CONTROL. Milestones in Taste and Odor Control, W. A. Welch. *Am. Water Works Assn.—J.*, vol. 38, no. 1, Jan. 1946, pp. 57–60. Development of methods for eliminating taste and odor conditions in water supply.

TREATMENT PLANTS, CHICAGO. Partial Treatment at Chicago Requires Meticulous Care, W. W. DeBerard and J. R. Baylis. *Water Works Eng.*, vol. 99, no. 5, Mar. 6, 1945, pp. 232–233. Report on operation of portion of Chicago's South District filtration plant, on which construction was started in 1938; two residual chlorine recorders are in use; one of them measures residual chlorine in water as it leaves the plant, the other is connected to mixing basin; illustration of filtration plants.

WATER CHLORINATION. Design and Calibration of Apparatus for Chlorination of Mains, R. J. Bell. *Water & Water Eng.*, vol. 48, no. 597 (winter), 1945, pp. 741–749. Illustrated description of apparatus based on following principles: (1) It automatically doses with chlorine, (2) chlorination is at constant rate, (3) it works also when main is laid on uphill grade, (4) no skilled operator is required. Injector apparatus described fulfills all these requirements.

WATER POLLUTION. Present Condition of Ohio River, A. R. Todd. *Am. Water Works Assn.—J.*, vol. 38, no. 1, Jan. 1946, pp. 41–44. Extreme pollution of river has caused enormous difficulties in treatment; present filtration plant has changed purification processes to meet changing demand of river condition; to meet increasing rate of pollution, it is planned to mix well water with river water.

WATER WORKS ENGINEERING

MAINTENANCE AND REPAIR. Survival and Retirement Experience with Water Works Facilities. *Am. Water Works Assn.—J.*, vol. 38, no. 2, Feb. 1946, pp. 247–305. Symposium on survival and retirement experience with water-works facilities at Jamaica, N.Y., Portland, Me., and Philadelphia, Pa.; data taken from privately owned Jamaica Water Supply Company, Portland Water District, and municipally-owned Philadelphia Water Works, respectively.

OHIO. Comprehensive Improvement Plan Undertaken by Ohio Water Works, D. D. Heffelfinger. *Water Works Eng.*, vol. 99, no. 5, Mar. 6, 1946, pp. 226–230, 250, and 252. Illustrated description of present water system and its planned improvements at Alliance, Ohio; flow diagrams, distribution system, filtration plant, meter repair shop, pumping station, etc.

VENEZUELA. Now Under Construction Is South America's Biggest Water Supply Job, E. J. Cleary. *Eng. News-Rec.*, vol. 136, no. 8, Feb. 21, 1946, pp. 297–301. Operations in progress, problems, and features of large water supply, project serving 400,000, under way in Caracas, Venezuela; job includes construction of major storage and diversion works, major replacement and extension of existing distribution systems, and installation of at least two treatment plants; role of American concerns, engineers, and supplies is brought out, and history of project noted.

WATER TANKS AND TOWERS, STEEL. Tank on a Hill. *Water Tower*, vol. 32, no. 4, Mar. 1946, p. 4. Welded steel reservoir 76 ft in diameter by 30 ft high provides additional storage capacity at Hermosa Beach, Calif., and Redondo Beach, Calif.; data on water consumption and storage facilities; illustrations.

Black on White for Better Sight

WYTEFACE "A" Steel Tapes have *raised* black graduations on a crack-proof white surface. Easy to read in any light, from any angle. Faster measurements with fewer errors. Designed for hard service. White background is protected by raised steel markings and rims. Resists abrasion from rails, pipe, rocks, concrete. Protected against rust. See your dealer. Write for catalog.

K+E

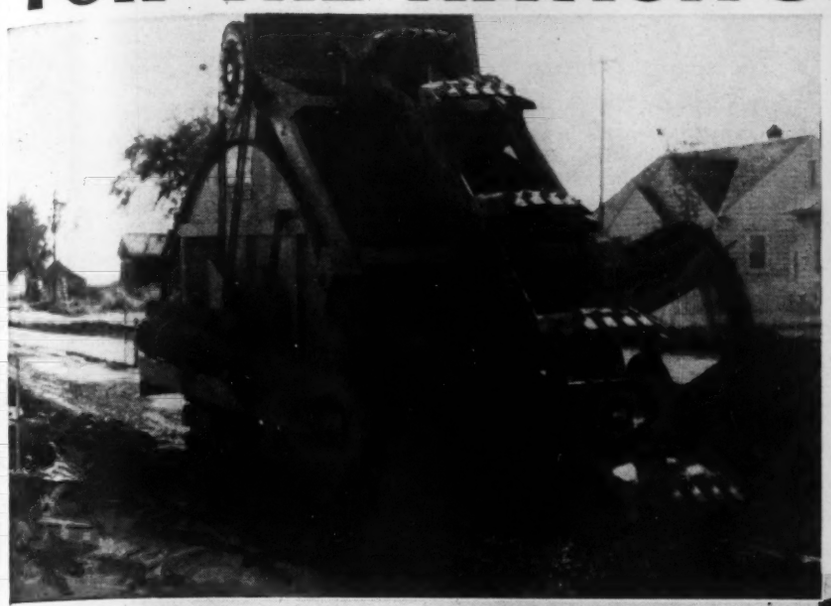
Drafting Reproduction Surveying Equipment and Materials Slide Rules Measuring Tapes

KEUFFEL & ESSER CO.
EST. 1867
NEW YORK • HOBOKEN, N. J.
CHICAGO • DETROIT • ST. LOUIS
SAN FRANCISCO • LOS ANGELES • MONTREAL

WYTEFACE "A"
TRADEMARK
STEEL MEASURING TAPES

FOR THE NATION'S BIG JOBS *Specify*

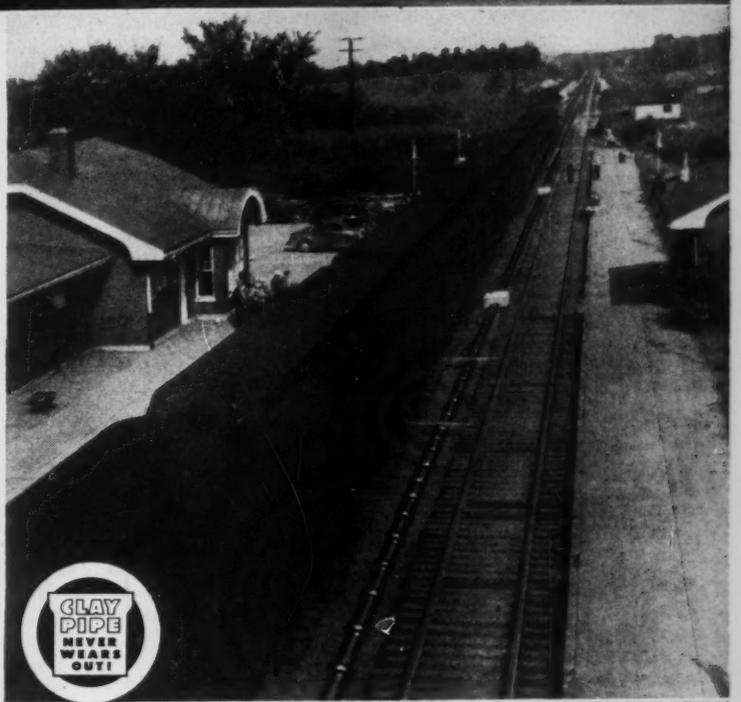
LOW COST-PER-YEAR CLAY PIPE



TODAY, engineers and builders are anticipating the needs of the future better than ever before. The life of drainage facilities need not be estimated as a matter of a few decades. Drainage installations *can last* . . . cost should be figured on a per-year basis over a long period of time.

Clay Pipe Never Wears Out because it is made of indestructible material, harnessed to man's use through vitrification. The men concerned with the construction and maintenance of big jobs, railroads, highways and airports are turning more and more to Clay Pipe for low cost-per-year drainage. Because it will not corrode, decompose or rust it does its job as well tomorrow as today.

A Modern Drainage Tip: Extra-Strength Clay Pipe eliminates or greatly reduces cradling and casement costs where extra-heavy loads are encountered.



National Clay Pipe Manufacturers, Inc.
522 First National Bank Bldg., Atlanta 3, Ga.
1105 Huntington Bank Bldg., Columbus 15, O.
111 W. Washington St., Chicago 2, Ill.
571 Chamber of Commerce Building
Los Angeles 15, Calif.

C-546-3D

CLAY PIPE

Equipment, Materials and Methods

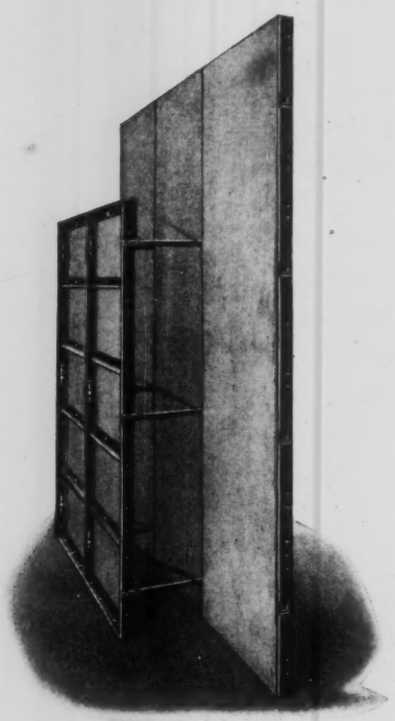
New Developments of Interest, as Reported by Manufacturers

A New Lifting Hook

THE DIAMOND TORQUE Hook, a new hook for lifting structural steel beams, girders, channels, etc., is announced by the Elizabeth Iron Works, Green Lane, Elizabeth, N. J. This patented one-operational lifting device, applies the principle of torque-action to do its work; and it is reported, as the load becomes greater so do the grips of the hook. It is stated that with the Diamond Torque Hook it is possible to lift and nest-stack steel shapes in one operation, eliminating the old method of lifting with slings and blocking between members of stacking. A circular describes hooks, capacities, and sizes.

Foundation Forms

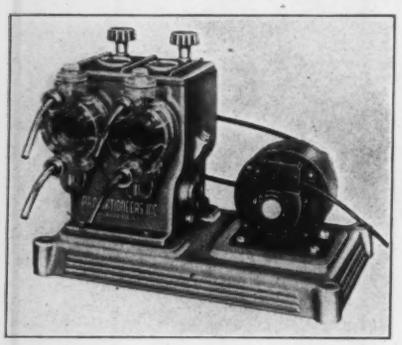
A NEW DEVELOPMENT for the concrete contractor and residential builder, announced by the Universal Form Clamp Company of 1238 North Kostner Avenue, Chicago, Ill., is a "ready-to-use" foundation form.



Made of steel, this new foundation form is welded into a rigid frame with $^3/_4$-in. plywood facing. It is furnished in two sizes —2 ft × 8 ft and 2 ft × 6 ft. The form is complete—no assembly of parts is necessary. A simplified method of tying with a standard Uni-Form Tie speeds erection and assures accurate forming and spreading. Steel angles have milled slots for ties. Other features claimed are—rigid outside corners—a simplified method of forming inside corners and pilasters. The manufacturer claims 40 to 60 re-uses.

Chemo-O-Feeder

THE DUPLEX DELUXE Chem-O-Feeder, a new chemical diaphragm type proportioning pump delivering chemical reagents in an almost continuous stream, has been released for civilian use by %Proportioneers, Inc.%, 14 Codding St., Providence, R.I.. It is designed for the positive



injection of one or two chemicals at predetermined and adjustable rates and is adapted for many uses including feeding chemicals for water sterilization. The feeding rate of each chemical is individually adjustable for coarse variations by changing the stroking rate through a two-step cone pulley and belt arrangement. For fine variations, a stroke length adjustment knob on top of the Chem-O-Feeder instantly varies the amount of solution fed per stroke. Transparent plastic reagent heads bare vital operating parts, such as diaphragms and check valves, to visual observation by the operator while the equipment is in operation. Also, each discharge stroke of the feeder is visible in sight feeder domes and any feeding irregularity may be detected. Moving parts inside the rugged unit case operate in an oil bath, resulting in long wearing life. The manufacturer will furnish information.

New Grading Machine

THE WARNER & SWASEY Company, Cleveland machine tool builders, are entering the road machinery field with the manufacture and sale of a new grading machine trade-named "Gradall," it was announced recently.

The machine, which is reported to permit earth-moving in places not ordinarily accessible to many types of excavating equipment, was invented by Ray Ferwerda, a Cleveland contractor, and the Warner & Swasey Company is licensed to build the machine under his patents. Hydraulically operated, the machine has an expandable 24-ft boom of arc-welded construction. The "Gradall" machine will be handled by distributors in the road machinery field. Production is now getting under way and the machine is expected to be ready for market soon.

Conveyor Idler

A NEWLY DESIGNED impact cushioning troughing idler for belt conveyors is being manufactured by Chain Belt Company. The use of these units, known as the Rex Style No. 35 idler, under the loading point will protect and greatly lengthen the life of the conveyor belt, it is stated. Each roll consists of a rubber cylinder vulcanized directly to the assembly tube. The cylinder has multiple grooves moulded into it . . . deep primary grooves for maximum cushioning to guard against belt carcass rupture . . . and shallow secondary grooves to provide surface softness for protection against belt cover laceration. Each roll is equipped for high-pressure grease lubrication and is regularly furnished with a hydraulic type fitting.

For all loading conditions, the cushion idler should be used to support the belt directly under the loading point. It is recommended that three to four units be used, spaced at one-half the normal idler spacing. Tests have shown a greater impact absorption capacity for this type design than that of other impact types, the manufacturer claims.

New-Type Bearing

DEVELOPMENT OF A new type of roller bearing capable of carrying heavier loads at higher speeds and lower temperatures—heretofore a "missing link" in the chain of anti-friction bearing evolution—was announced by SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

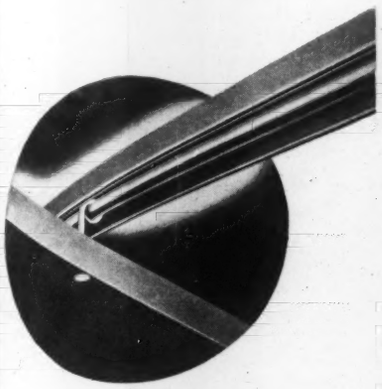
The company reports that the new development, technically known as a spherical roller thrust bearing, climaxes a 10-yr research program to solve the difficult problem of combining in a single bearing the triple features of high-load capacity, speed, and low temperature.

The new-type spherical roller thrust bearing is expected to ease maintenance and operating problems on large vertical water pumps, electric generators, and other high-speed machines. Other important applications are thrust mountings for railroad turntables, water turbines, water wheels, dredge pumps, and various types of gear drives.

The bearing's self-aligning principle which compensates for any shaft deflections, distortions, or weaves permits heavy loads to be distributed evenly over all rollers and eliminates danger of overloading. Because of its compactness, it utilizes less space and is lighter in weight than a plain bearing. Another feature of the bearing is a cage-retaining sleeve pressed into the bore of the inner ring, making a contained assembly of the rollers, cage, and inner ring. SKF production facilities have been tooled to develop preferred sizes for immediate manufacture.

A New Nailing Device

AMONG VARIOUS methods used for attaching tile, panels, slabs, accoustical and insulation sheets, and other coverings to steel, concrete, and masonry in Nailock Steel Nailing Channels. The Nailock channels are usually spaced not over 24 in. apart, and are set in concrete or attached to steel furring channels or structural steel members by clips, wiring, or spot welding. The Nailock channels may



be attached in vertical, horizontal, or inverted positions. Special nails of different sizes are supplied with the channels. They have varying shaped heads and rectangular, tapered shanks. When driven into the channel, the nail bends readily, hooking itself automatically around the rod which is the characteristic feature of Nailock channels. The nail, if extra long, is said with further hammering to wrap itself around the rod even beyond the point of one complete revolution, fitting tightly between the rod and the channel.

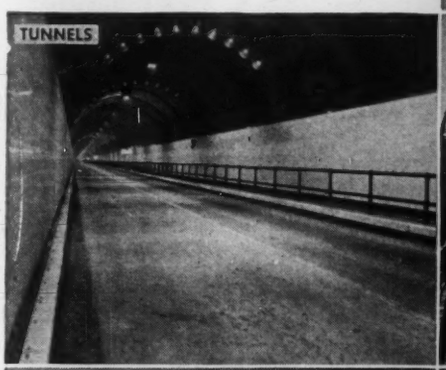
The distance between the two edges of the standard Nailock channels at the widest point is nearly three-quarter inch, affording unusually wide nailing course. The Nailock Nail will therefore always strike somewhere within its limits, even when nailing through reasonably thick materials. This feature makes for speed in installation. The Sanymetal Products Co., Inc., 1705 Urbana Road, Cleveland 12, Ohio.

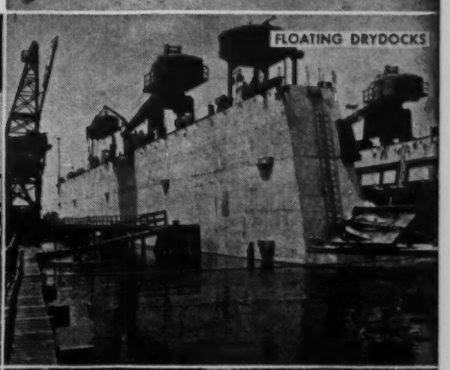
Sensitized Papers

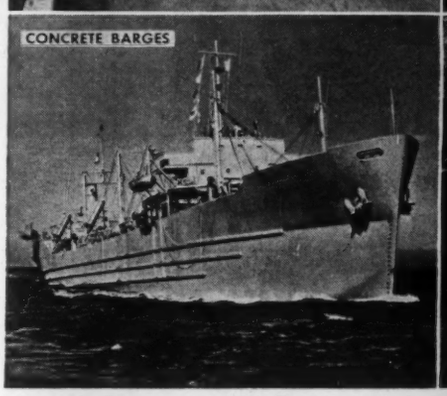
POSITIVE PRINTS may be made direct from engineers' drawings and tracings without the use of a negative, it is claimed with the new Weiline sensitized papers. A dry direct process of development, which uses no wet chemicals, quickly produces prints that are flat and true to scale.

Blue, red, or sepia prints are obtainable with these new papers; this choice of color (blue, red lines on white background) permits quick recognition of prints from different departments, and differentiates checked from unchecked prints. Sepia prints on Weiline transparentized papers may be used as intermediate originals, to save the draftsman's time in retracing when making design changes. A special Weiline eradicator removes obsolete lines and new ones may be drawn in with pen or pencil. J. H. Weil & Co., 1315 Cherry St., Philadelphia, Pa.

Solving CONCRETE Problems







Sika Products are available for pressure grouting, expansion joints, floor hardening, tile setting, watertight and improved concrete.

6-SI-1

Sika
Reg. U. S. Pat. Off.

SIKA CHEMICAL CORPORATION

45 Gregory Avenue Passaic, N. J.

Manufacturers of

Structural Waterproofing Compounds • Plastiment, The Concrete Densifier

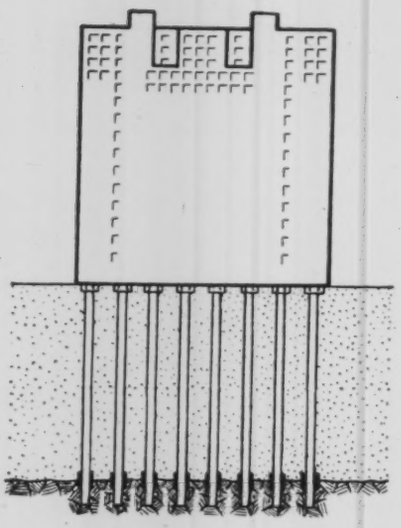
Electrodes for Hard-Facing

ONE NEW AND ONE improved shielded arc electrodes, each of the type designed for specific hard-facing applications, have been announced by The Lincoln Electric Company, Cleveland, Ohio.

"Abrasoweld AC," designated as a hard-facing shielded arc electrode, is designed for building up straight carbon steel, low alloy steel or high manganese steel with a self-hardening deposit to resist severe abrasion, battering and impact. Although specially designed for operation on alternating current, it may be used for both the industrial type and small, mass-market type welding machines and direct current. This new "Abrasoweld AC" electrode is available in $^1/_8$, $^5/_{32}$, and $^3/_{16}$-in. sizes and is furnished in 14-in. lengths.

"Manganweld A," suspended for the duration, has been improved and is now manufactured specially for reclaiming worn austenitic manganese steel parts containing 11% to 14% manganese. It is particularly suited for use with direct-current machines, and may be used with the industrial type alternating current, and small, mass market type welding machine. "Manganweld A" is recommended for all resurfacing and building up applications of high manganese steel and is sometimes applied only as top beads where an abrasion resisting surface is required. This electrode is furnished in $^5/_{32}$, $^3/_{16}$, and $^1/_4$-in. sizes and 14-in. lengths.

FOUNDATIONS FOR BUILDINGS



DRILLED-IN CAISSONS

anchored in Rock Sockets

These patented foundations are designed for heavy loads—up to 1500 tons on a single caisson—and can be sunk to great depths through difficult ground.

Send for catalog and reprints descriptive of jobs done.

DRILLED-IN CAISSON CORPORATION

Affiliated with

Spencer, White & Prentis, Inc.
10 E. 40th St., New York 16, N. Y.

Western Foundation Co.
155 E. 42nd St., New York 17, N. Y.
308 W. Washington St., Chicago 6, Ill.

GOLDEN-ANDERSON

Design and Build

OVER 1500

TYPES AND SIZES IN

AUTOMATIC

VALVES

For Engineered Protection on any HIGH PRESSURE INSTALLATION

- **Make Golden-Anderson Valves your first choice on any new or replacement project—for maximum safety, dependability and protection.**

Descriptive Technical Catalog on request

GOLDEN-ANDERSON
Valve Specialty Company
KEENAN BUILDING
PITTSBURGH 22, PA.

It Can Be *Your* Library Department!

A trained staff and a fully equipped library would be a valuable addition to your company. The Service Bureau of the Engineering Societies Library can be that new department in your organization, yet more adequately manned and better equipped than any individual organization library could possibly be.

Use this service. Over 4,000 bibliographies on engineering subjects are on file. 150,000 engineering texts and files of every worth-while periodical are available for further research to meet your specific needs. A letter, a telephone call or a telegram will place the Service Bureau at your service.

Use the service of *your* Engineering Library—The charges cover only the cost of the service and represent but a fraction of the value you will receive.

The Engineering Societies Library
29 West 39th Street, New York, N. Y.

Postwar Shovel and Crane

THEIR FIRST postwar shovel and crane, the TL-20, embodying many new engineering and design principles, has been announced by The Thew Shovel Company, of Lorain, Ohio. The new TL-20 can be equipped with a choice of five interchangeable booms and ten different types of mountings, enabling it to meet any and all job conditions. An important feature of its turntable design is the Unit Assembly principle which enables each major component, the clutch shaft, the cab, the engine and accessories, and the hoist shaft, to be removed as a unit.

The TL-20 may be mounted on either crawler or rubber-tire mountings. The crawler mounting is a chain-driven unit with two speeds available in both directions. Rubber-tire mountings cover all combinations and types of four- and six-wheel units, with or without front wheel drive, in two-engine Moto-Cranes, and single-engine, self-propelled units. Single-engine, self-propelled units in both four- and six-wheel types are available. The single turntable engine powers all turntable operations and also propels the unit. These have four speeds forward and reverse, with a speed range up to 7¾ miles per hour.

The TL-20 for crane-lifting purposes comes complete with all equipment and accessories, including a two-piece all-welded boom which is in two 15-ft sections joined by flanged bolted connections. The center sections are easily inserted for longer booms. On the all-purpose boom head two sets of sheaves, arranged in tandem, produce a modified "hammerhead" boom which offsets the cable leads so that loads cannot foul the boom.

The TL-20 shovel boom offers a positive, independent crowd of tremendous digging force, according to the manufacturer. This crowd permits crowding or hoisting independently or both can be combined when necessary. The crowd and retract cables operate from the reversible left-hand hoist drum, whose brake serves as a crowd brake to hold the stick extended. The shovel boom is an all-steel, unified all electrical welded structure, with large diameter, boom head sheaves. The square stick is also an all-steel, all-welded unit and the stick slides in a shipper shaft sleeve which is lined with adjustable and hardened wearing blocks. An electric dipper trip is provided. The same device used to trip the dipper serves as a tagline on clamshell units. The TL-20 has a boom of all-welded structure, goose necked to give the maximum offset and greatest digging depth.

SHIPS

★ ★ ★

HYDRAULIC TURBINES
—and—
ACCESSORY EQUIPMENT

★ ★ ★

PRESSURE VESSELS

★ ★ ★

STEEL, IRON and
BRASS CASTINGS

★ ★ ★

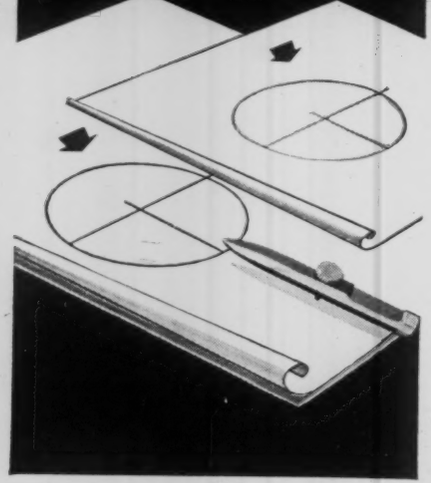
HEAVY FORGINGS—
ROUGH or
COMPLETELY MACHINED

★ ★ ★

NEWPORT NEWS SHIPBUILDING and DRY DOCK COMPANY

NEWPORT NEWS, VIRGINIA

Tracing cloth that defies time



● The renown of Imperial as the finest in Tracing Cloth goes back well over half a century. Draftsmen all over the world prefer it for the uniformity of its high transparency and ink-taking surface and the superb quality of its cloth foundation.

Imperial takes erasures readily, without damage. It gives sharp contrasting prints of even the finest lines. Drawings made on Imperial over fifty years ago are still as good as ever, neither brittle nor opaque.

If you like a duller surface, for clear, hard pencil lines, try Imperial Pencil Tracing Cloth. It is good for ink as well.

IMPERIAL TRACING CLOTH

SOLD BY LEADING STATIONERY AND DRAWING MATERIAL DEALERS EVERYWHERE

Versatile Jet Pump

PORTABLE EDUCTORS, widely used on shipboard by the Navy and Merchant Marine, are now available for industrial use. These Eductors, manufactured by Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa., find ready use in pumping operations as they combine versatility with low initial and maintenance costs. They are of simple, sturdy construction with no moving parts and can be made of a variety of materials including plastics to enable them to fit the needs of special processes or conditions.

A high-velocity pressure jet entrains the secondary liquid to be moved and converts the kinetic energy of the pressure liquid into static head capable of lifting water up to 75 ft. The pressure water used may be obtained from water mains, pumps, head races, or similar sources. Since no foundations are required and hose can be easily coupled on, Portable Eductors, are readily used where other types of pumping equipment would not be suitable.

Concrete-Handling Equipment

THE DUMPCRETE, a new construction tool for transporting air-entrained concrete from a central mixing plant to the job site, is announced by the Maxon Construction Co., Inc., Dayton, Ohio.

The Dumpcrete is being produced in two models, 2C and 4C, with respective rated concrete capacities of 2 and 4 cu yd. Struck volumes are 3.5 and 6.25 yd. Height of discharge is 4 ft-3 in. for Model 2C and 6 ft-3 in. for Model 4C when mounted on standard truck chassis. A specially designed and arranged hydraulic hoisting mechanism provides a dumping angle of 90 degrees. This dumping angle, plus the fact that all corners are rounded and interior welds ground smooth, make possible a clean and fast discharge. An adjustable baffle, deflector plates, and an inverted center keel provide a discharge similar to that of a bottom-dump bucket. Standard equipment also includes a specially designed gate, a hopper for directional discharge, and two sections of chute, one 5 ft-6 in. in length and the other 5 ft. The gate may be removed.

M H

HYDRANTS & VALVES

Pipe Line Accessories for Water Works and Sewage Works

VALVES: A.W.W.A. type iron body, bronze mounted with double-disc parallel seat or solid wedge type. Non-rising stem, outside screw and yoke, or with sliding stem and lever. Also furnished hydraulically operated. Square bottom type operates in any position. All rugged and dependable, made of best material with highest quality workmanship.

HYDRANTS: Standard A.W.W.A. type approved by Underwriters and Factory Mutuals. Dry top, revolving head, easy to lubricate. High efficiency because barrel diameter not reduced and there are no working parts or obstructions in waterway. SPECIAL TRAFFIC MODEL is designed to yield at ground line under impact, repair being simply renewal of breakable bolts and breakable coupling on stem.

M & H PRODUCTS INCLUDE

FIRE HYDRANTS
GATE VALVES
TAPPING VALVES
WALL CASTINGS
SPECIAL CASTINGS
TAPPING SLEEVES
CHECK VALVES
FLOOR STANDS
EXTENSION STEMS
SHEAR GATES
MUD VALVES
VALVE BOXES
FLAP VALVES
SLUDGE SHOES
FLANGE AND FLARE FITTINGS
FLANGED FITTINGS
B & S FITTINGS
CUTTING-IN TEES

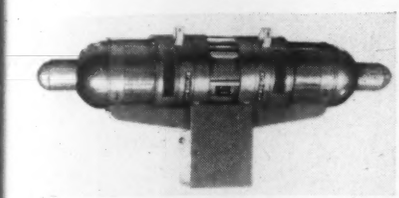
M&H VALVE AND FITTINGS COMPANY

ANNISTON, ALABAMA

1200-Ampere Welder

A NEW WELDER of 1,200 amp comprising two 600-amp generators, close-coupled to an A.C. induction motor and equipped with complete motor control is announced by The Lincoln Electric Company, Cleveland, Ohio, for use with the company's recently introduced "Lincolnweld" Process of automatic metallic shielded arc welding. The unit is of arc welded steel, drip-proof construction and is completely wired, ready for connection to the a-c power source and to the "Lincolnweld" head of the stationary, self-propelled carriage or tractor type.

Generators are of the variable voltage type with completely laminated magnetic circuits (frame and pole pieces) and equipped with interpoles. They require no external reactance or stabilizer. Armatures are insulated with glass and mica insulation to permit sustained operation at high loads. Interpoles are insulated with asbestos. Series coils are so liberally designed that Class "A" insulation only is needed.



Motor is of the squirrel cage induction type arranged for Y-Delta starting. Size of motor is ample for heavy overloads. Connection is for 220, 440, or 550 volts, three or two phase, 60 or 50 cycles.

One 125-v exciter assures ample power for both generator field excitation and for operation of the d-c control circuits of the Lincolnweld equipment and the travel carriage and tractor motor when used. The other, a 35-v exciter, provides the auxiliary power for the wire feeding motor in the head. Exciters and main welding generators are electrically separate so as to improve welding performance and reduce upkeep costs. Exciters are direct connected on end of each generator. Exciter armature mounted by sleeve construction on same shift as generator armature.

The front part of the control cabinet contains the d-c generator output terminal connections and a terminal board for readily making connections from the automatic equipment to the two exciters and the welder field circuit. Designated as SA-1200, this new welder weighs 3,200 lb and is designed for easy mounting.

Tractor Loader

A NEW FRONT-END tractor loader, the Drott Hi-Lift Loader, with extremely high lift and reach, is now manufactured by Drott Manufacturing Corporation, 5141 North 35th St., Milwaukee 9, Wis. Designed for mounting on Oliver Cletrac crawler tractors, this machine has been in use over a year, and according to the manufacturer has cut loading cost of material handling on various operations—from digging basements and loading loose materials, to stripping coal mines and excavating hard clay.

MR. CONTRACTOR

It is your responsibility to control the air content of the concrete.

Read the new "specs" on the amount of air that must be entrained, and then use Darex AEA as a gauge-water addition. You can meet the specifications and keep the control of the air content in your hands. It's the only way you can compensate for changes occurring in the field.

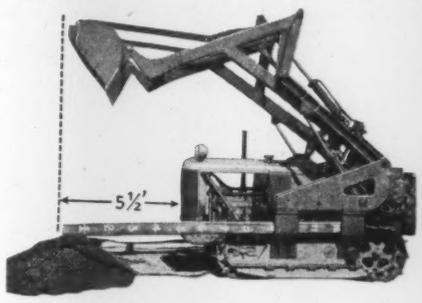
Darex AEA costs only a few cents per yard. It is safe, harmless. Comes ready to use. Darex Air Entraining Concretes save you time and labor because they are plastic, workable, reduce segregation and bleeding, speed up finishing, give durable concrete. — DEWEY AND ALMY CHEMICAL COMPANY, Cambridge 40, Massachusetts.

Use Darex AEA with Confidence

Measuring meters available

Simple metering devices for Darex AEA are available. Write for details.

The Drott H-Lift Loader has a lift of approximately 10 ft 8 in. and dumps its load about 5 ft ahead of the radiator. The standard bucket has a capacity of $1\frac{1}{4}$ yd and a light material handling shovel of $1\frac{3}{4}$ yd is available.



The unit is hydraulically operated, using the Drott Closed Hydraulic System with no air vent to allow air or dirt to enter nor oil to escape. It is equipped with a front-mounted pump. Outstanding features of the Drott Hi-Lift Loader are: The hydraulically controlled shovel bucket is regulated, either up or down, loaded or empty, by finger-tip controls while tractor is in motion or standing still. Load is not carried on the tractor but semi-skidded to destination. When breaking out of the cut, the weight of the entire load is transferred to the shoes, which are making ground contact. The shovel is rolled back, bringing the load back closer to the tractor, eliminating spillage.

Preliminary surveys for highway construction, drainage and irrigation systems, dams, water lines, all divisions of civil engineering are speeded up by the *NEW* Paulin Precision Surveying Aneroid. Readings to two feet over a range of 4360 feet are as easy as reading a watch. Other models cover ranges to 18,000 feet. Write for complete literature and FREE COPY of the *Paulin Altimetry Manual.*

AMERICAN PAULIN SYSTEM
1847 SOUTH FLOWER STREET
LOS ANGELES 15, CALIFORNIA

"KNOW HOW" IN PURIFICATION

Jeffrey
Specialists

Offers a complete line of improved units for efficient operation of sewage and water treatment plants

Bar screens
Chemical feeders
Floctrols
(controlled Flocculation)
Grit collectors
Grit washers
Screenings grinders
Sludge collectors
Sludge elevators
Scum removers
Also equipment for biofiltration plants (All Patented)
SEND FOR CATALOG #775

The Jeffrey Manufacturing Co.
824-99 N. Fourth St., Columbus 16, Ohio

Baltimore 1 · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 13 · Denver 2 · Detroit 13 · Harlan · Houston 5 · Huntington 19 · Jacksonville 5 · Milwaukee 11 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 3 · Salt Lake City 1 · Scranton 3

Literature Available

PIPE GUIDE—A new 56-page catalogue featuring applications of light-weight pipe in diameters from 4 to 30 has been issued by the Naylor Pipe Company, 1230 East 92nd St., Chicago 19, Ill. Illustrated are installations showing the application Naylor Lockseam Spiralweld Pipe in the many fields in which light-weight pipe is used to advantage. Along with valuable data on pipe structure are sections on precision fabrication and pipe connections including an entirely new type of coupling.

PAVING PRODUCTS—A new 16-page Keystone Paving Products Catalog lists and illustrates the company's complete line of paving joints, sealing compounds, concrete curing compounds, and sewer joint compounds. Engineering designs and specifications are included. Keystone Asphalt Products Company, 43 E. Ohio St., Chicago 11, Ill.

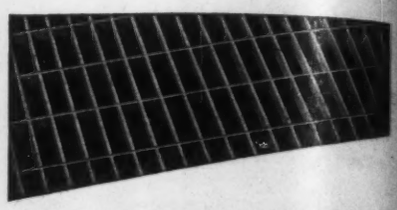
PUMPS—Form 7057, a new 20-page, two-color catalog covers the design, construction, and engineering details of Cameron Single-Stage general service pumps. These pumps are suitable for a wide variety of services wherever liquids have to be handled. Their applications include condenser circulation, air-conditioning equipment, transfer service in sugar refineries, chemical plants, oil-tank farms, beverage plants, food-packing plants and many other industrial hydraulic requirements. These single-stage units are designed for capacities to 25,000 gpm, against heads up to 300 ft. They are available in several combinations of metals for a wide variety of liquids. Ingersoll-Rand Company, 11 Broadway, New York 4, N.Y.

SAFETY RELIEF VALVE—The Cochrane Multiport Safety Relief Valve is described in publication 4150. Its numerous applications in relief of steam, air, gas, gasoline and oil vapors, water, etc., and adaptableness to other services are cited. Included is the revised "Sizing Data on Relief Valves" which covers capacity and pressure rise tables unusually convenient to use for size selection.

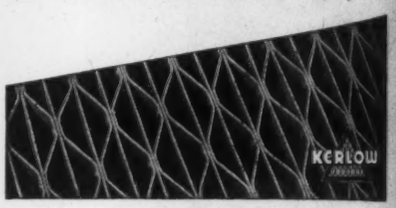
SPEED REDUCERS—A new 16-page bulletin entitled "Earle Speed Reducers as Applied to Operating Machinery," containing useful engineering data and information of value in selecting the proper reducing unit for various needs. Fully illustrated, showing installations in movable bridges, ferry lifts, gates, dams, and other types of machinery. The Earle Gear and Machine Co., 4707 Stenton Ave., Philadelphia 44, Pa.

TURBINE OIL—Operating characteristics and advantages of Gulfcrest Oil for steam turbine lubrication are described in a handsome new booklet just issued by Gulf Oil Corporation, 3800 Gulf Building, Pittsburgh, Pa. The booklet includes a picture story of the exclusive Alchlor Process.

WROUGHT IRON—Numerous photographs depicting the utilization of wrought iron piping, bars and flat rolled products in the bridge-building and heavy construction industry are included in the revised edition of "101 Uses for Wrought Iron," A. M. Byers Company, Pittsburgh.



KERLOW
Open Steel
GRATINGS

Widely used for floors, platforms, walk-ways, stairways, etc., in every type of building
Light . . . strong . . . safe . . . economical
Backed by 30 years of experience
Reticulated and Rectangular patterns in a range of sizes for every application
FREE . . . Profusely illustrated catalog sent on request. Write for your copy today

KERLOW STEEL FLOORING COMPANY
218-C Culver Avenue, Jersey City 5, N. J.